

No. **FEB 1 1915** Vol. VIII.

January, 1915.



10/6 Yearly.

THE JOURNAL OF ELECTRIC
ILLUMINATION.

1/- a Copy

OFFICIAL ORGAN OF THE
Illuminating Engineering Society.
(Founded in London 1902.)

This number contains the complete Discussion
entitled: "**Illuminating Engineering in
War Time; some Lessons to be learned
from the present lighting of London,**"
opened by **Mr. L. Gaster** at the last meeting
of the Illuminating Engineering Society, on
December 1st, 1914.

Other matters dealt with include—

A YEAR'S PROGRESS IN ILLUMINATING ENGINEERING—
THE LIGHTING OF A FAMOUS HALL—LIGHTING IN PARIS
DURING THE WAR—RATING OF LAMPS IN LUMENS—THE
DESIGN OF SHOP LIGHTING—A NEW STREET LIGHTING
UNIT, &c.

ILLUMINATING ENGINEERING PUBLISHING COMPANY, LTD.,
52, VICTORIA STREET, LONDON, S.W.
(TEL. NO. VICTORIA 3213.)

THE SAME FUEL FOR

Lighting and Heating

GAS as a medium of lighting and heating has eminently justified itself as the most hygienic, economical and convenient of all artificial systems. Gas gives a soft light, restful to the senses, serves to assist ventilation, and effects the cleansing of the air from disease germs.

The modern form of Gas—with inverted incandescent mantles—is eminently suited for artistic interiors, lending itself as it does to delicate shading and modification to satisfy every taste.

Write for full particulars to
THE GAS LIGHT AND COKE COMPANY,
Horseferry Road, Westminster, London, S.W.



THE JOURNAL OF SCIENTIFIC
ILLUMINATION.

OFFICIAL ORGAN OF THE
Illuminating Engineering Society.
(Founded in London, 1909.)

ILLUMINATING ENGINEERING PUBLISHING COMPANY LTD.
32, VICTORIA STREET, LONDON, S.W.
Tel. No. 5215 Victoria.

EDITORIAL.

Progress of the Past Year.

In the early part of 1914 a considerable amount of useful work was done by the Illuminating Engineering Society. In January the subject of daylight illumination, with special reference to school lighting, came up for discussion, and a very complete paper by Mr. P. J. Waldram was presented on this subject. At the same time a series of queries was addressed to a number of distinguished corresponding members of the Society in Europe and America, and the information received formed a most useful preliminary to further action. Subsequently a special sub-committee of the school-lighting committee was appointed to make further investigation and to report to the main Committee the results of their deliberations. The report was submitted to the Council and issued as the report on "The Natural Lighting of School Rooms," which was published in the July number of the **ILLUMINATING ENGINEER**. The Committee carried out a considerable number of investigations and tests in schools of various types, and the report received an exceptional amount of attention throughout the whole country, and particularly by the educational authorities and the press connected with these matters.

At the meeting following, a discussion on "The Lighting of Art Studios and Picture Galleries" was opened by Professor Silvanus Thompson, both natural and artificial lighting being considered. The previous work on daylight problems and the investigations carried out by members of the Society during 1913 on the subject of "Shadows by Artificial and Natural Light" provided a useful introduction to this paper.

Following this there were papers by Professor Clinton and Mr. A. P. Trotter. Professor Clinton's interesting and instructive contribution showed the practicability of working out beforehand the illumination to be derived from any given scheme of lighting, and subsequently verifying these results by actual measurements. Mr. Trotter dealt with the "Nomenclature of Photometric Quantities"—a matter of considerable importance from an international standpoint. Here again the assistance of corresponding members of the Society on the Continent and in America were found of great value. Among other features of the session we may note the discussion of the "Lighting of Railway Carriages and Public Vehicles," opened by Mr. E. Kilburn Scott.

THE LIGHTING OF LONDON.

A paper before the London Society on the Lighting of London was also read by the writer. In this paper data were provided showing the remarkable progress in the Lighting of London during the last thirty years, and a number of photographs, taken especially by artificial light, were presented.

The paper emphasised the great opportunities for developing the artistic side of public lighting and the illumination of the public parks. The writer also pointed out the great variety of authorities by whom the lighting of London is controlled, and the need for some central department for dealing with the technical and artistic aspects of the subject in a scientific co-ordinated manner. In view of the Bill now before Parliament regarding the proposed reorganisation of London's electricity supply, this point is of special interest. The London Society, it is hoped, will use its influence in carrying into effect some of the suggestions made in the paper. Among other events of interest in the early part of 1914 there remains to be mentioned the Annual Dinner, which was attended by a number of distinguished guests, and proved to be one of the most successful yet had; a gratifying feature was the presence in the chair of Sir William Bennett, K.C.V.O., F.R.C.S., the new President of the Society. The occasion was taken to put on record the Society's high appreciation of the services of Professor Silvanus Thompson, who occupied the Presidential Chair during the initial four years of the Society's existence.

THE OUTBREAK OF WAR.

When the session came to an end, therefore, everything pointed to an active resumption of work under favourable conditions in the autumn. The continued existence and prosperity of the Society in this country was assured. The Society in the United States and the newly formed Society

with similar aims in Germany were also actively carrying on the work; and in France and Belgium and other countries illuminating engineering was making steady progress. The international side of the movement had assumed definite shape, through the formation of the International Commission on Illumination, and in this country arrangements had been made for active steps to be taken with a view to extending the movement throughout the United Kingdom. The August issue (1914) of the *ILLUMINATING ENGINEER* contained a special summary of the work of the Society up to date, and was specially prepared with a view to increasing the membership of the Society and to extend its scope of operation.

Within a few weeks after the issue of that number many of those who had been establishing friendly relations became enemies. On the Continent, owing to the vast preparations for war, the movement is in abeyance. Even in this country many outlets for our activities have been checked. Many of those upon whose aid we had counted are now serving their country with the forces. Support confidently expected was for the time being inevitably diverted elsewhere, and it was at once evident that the proposed widespread effort to arouse interest in the movement would have to be postponed.

OPPORTUNITIES OF THE ILLUMINATING ENGINEERING MOVEMENT.

Nevertheless it was felt to be essential to maintain the continuity of the Society's work, and in spite of existing difficulties to "stand by our guns" and preserve the movement which has been so laboriously built up during the last few years. While the war has inevitably checked our work in some directions, it has provided opportunities of usefulness in others. One of the first results of hostilities was a considerable amount of dislocation of the lighting industry owing to the stoppage of Continental supplies. Immediately after the declaration of war inquiries were made among various firms interested in lamps and lighting appliances, and the results were published in the *ILLUMINATING ENGINEER*.*

FOSTERING THE MANUFACTURE OF LIGHTING MATERIALS AND APPLIANCES.

It was freely acknowledged that the withdrawal of Continental supplies had caused inconvenience.

It was, however, realised that the present inconvenience of not being able to import many needful things might lead to their being manufactured in this country. The unparalleled circumstances brought about by the present war present a unique opportunity to the lighting industry, and our investigations during the last few months have shown that there are many sections of the industry which are meeting the new conditions with commendable enterprise. But, as we have pointed out before, no industry worth capturing can be built up without long and sustained effort, careful organisation, and indomitable enterprise. In particular, it is essential to find out at an early stage which is practicable and what is not. It has, therefore, been suggested to the authorities in this country that committees,

* September and November, 1914.

composed of men with technical knowledge, should be formed in order to make a complete scientific survey of certain sections of business—such as the lighting industry—which deal with absolute national necessities. We are hopeful that the efforts being made in this direction will lead to useful results. In passing, we would like to say that the illuminating engineering movement has every reason to be satisfied with the friendly attitude by authorities in this country towards its aims and objects.

THE LIGHTING IN LONDON IN WAR TIME.

Another matter which has certainly affected the lighting industry deeply is the regulations imposed by the authorities for the darkening of the streets and the restrictions on shop lighting. Recognising the immediate importance of these conditions, the Society took up the matter at its opening meeting in the present session on December 1st, which is reported in our present number (see pp. 11-26). At this meeting the question of show window lighting received special attention.

We are all of us willing to accept loyally any regulations made in the interests of the defence of the Realm. On the other hand, it must of course be recognised that such measures, however necessary for safety, do have a restriction on business as well as being prejudicial to the lighting industry, and the Council of the Society is now suggesting some more specific recommendations on window lighting with a view to securing compliance with the regulations and, at the same time, getting the most satisfactory illumination.

A RECORD OF THE PRESENT LIGHTING CONDITIONS NEEDED.

Circumstances have provided us with an opportunity of seeing some experiments in street lighting which would never have been tried in ordinary times, and it ought to be possible to extract some useful lessons from the results. Permission has already been obtained from the authorities to take a series of photographs and measurements of illumination in the streets of London, so as to form a record of the present conditions. It would be of the greatest value to have also an analysis of the effect of the new conditions on traffic and to trace as closely as possible the relation between diminished illumination and the number of accidents in the streets.

Finally, we may conclude by asserting our conviction that the present time with its changing conditions in public illumination and reconstructions in the fabric of the lighting industry, make the existence of the illuminating engineering movement of even greater value than in ordinary circumstances, and we hope that all supporters will help us with greater determination and increased vigour to keep the work alive.

Before completing this short review we take the opportunity of thanking the technical daily press for the greater attention they constantly pay to the value of good lighting and the recognition given to the good work of the Society.

LEON GASTER.

TECHNICAL SECTION.

The Editor while not soliciting contributions, is willing to consider the publication of original articles submitted to him, or letters intended for inclusion in the correspondence columns of "The Illuminating Engineer."

The Editor does not necessarily identify himself with the opinions expressed by his contributors.

A YEAR'S PROGRESS IN ILLUMINATING ENGINEERING.

(A Report presented by the Committee on Progress at the Eighth Annual Convention of the Illuminating Engineering Society (U.S.A.), at Cleveland, Sept. 21-24, 1914; slightly abbreviated.)

(Continued from page 552 in Vol. VII.)

Street Lighting.

The constant demand for better public lighting is reflected in the increase in installations in some of the large cities of the country, during the past year. The luminous arc was being installed in large numbers up to the time of the introduction of the non-vacuum high efficiency tungsten lamp. There is already considerable evidence that the latter will be used in many places to replace the former.

Portland, Ore.—In Portland, Oregon, there has been an increase of 300 in the number of arc lamps with a decrease in rates of 7.8 per cent. for overhead arcs and 15.2 per cent. for underground. On one street ten blocks of display lighting has been installed consisting of arches at street intersections having a 1,000-watt lamp in the centre, and 48 40-watt lamps in each arm of the arch.

Seattle, Wash.—Seattle claims to be the first city to try out the new non-vacuum lamps for street lighting.⁶¹

Los Angeles, Cal.—The constant growth in the use of automobiles has increased the demand for well-lighted roads outside as well as inside the city. A large

boulevard system within fifteen miles of Los Angeles has been equipped with 375 tungsten standards,⁶² and 600 will be required to complete the system.

Denver, Colo.—In Denver 100 new metallic flaming arc lamps have been put in, as well as 100 enclosed carbon arcs, while in one street ornamental lighting has been installed to the extent of 102 standards carrying four 40-watt tungsten lamps each.

New Orleans, La.—New Orleans has increased the number of arc lamps used by 52 and installed 92 standards each equipped with a 200-candle-power series tungsten.

Galveston, Tex.—Galveston has installed 60 inverted arcs⁶³ on standards six to the block.

Milwaukee, Wis.—In Milwaukee 200 inverted flaming arcs have been added,⁶⁴ rated at 3,500 candle-power and spaced 50 to 60 feet (15.24 to 18.29 m.) apart. In addition an ordinance has been passed authorizing a study of street lighting systems⁶⁵ to determine the one best suited to the needs of the city.

⁶² *Elec. World*, December 6, 1913, p. 1165.

⁶³ *Lt. Jour.* (U.S.), May, 1914, p. 108.

⁶⁴ *Elec. World*, January 24, 1914, p. 210.

⁶⁵ *Elec. World*, June 27, 1914, p. 1480.

⁶¹ *Elec. World*, January 10, 1914, p. 98.

Minneapolis, Minn.—Minneapolis has increased the number of magnetite arcs from 2,400 to 2,800⁶⁶ while the rate has decreased 4 per cent. One hundred gas lamps have been dropped.

Chicago, Ill.—The following table shows the progress in Chicago:—

	June 1, 1913.	June 1, 1914.
Arc lamps	17,084	18,973
80-watt tungsten lamps	814	4,433
Gas lamps	12,714	11,761
Gasoline lamps ..	7,845	5,120
25-watt subway lamps..	302	4,409

Arrangements were completed, except for hanging, for the installation of 3,839 flaming arc lamps, but a trial installation of 2,000 of the new non-vacuum high efficiency tungsten lamps, 300-watt size, has replaced part of these. The cost of arc lamps not municipally lighted has remained the same. The cost of those under municipal operation (depreciation and investment charges allowed for) has decreased 6·7 per cent. The municipally operated tungsten lamps decreased in cost 12·4 per cent. The cost of gas lamps dropped 2·8 per cent., while gasoline lamps operated under contract were renewed at a decrease in contract price of 3 per cent. per lamp.

The latest development (June 19, 1914) has been a decision to replace 1,000 direct-current open arcs and 6,000 7-ampère carbon arcs with the new tungsten units.

Detroit, Mich.—Progress in Detroit⁶⁷ is indicated by the addition of 240 4-ampère arcs on underground circuits and 575 of the same lamps on overhead circuits, as well as 100 inverted magnetite arcs at intervals of 159 feet (48·47 m.) measured centre to centre.

Washington, D.C.—At Washington, D.C. a number of series enclosed arc lamps have been replaced by the 6·6-ampère luminous arcs, the latter being mounted on standards especially designed for the purpose. But on the other hand 946 arc lamps of various types have been replaced by 1,573 125-candle-power incandescent lamps and 206 80-candle-power lamps all on underground circuits. The number of gas lamps, 60-candle-power mantle type is 10,246 with a gradual yearly increase.

Philadelphia, Pa.—In Philadelphia the number of arc lamp—used increased from 14,421 to 14,425 while there is a regular yearly increase of 300 in the number of gas lamps. The latter are provided free. The cost of arc lamps decreased 5 per cent. per lamp. Gasoline lamps remained unchanged in number and price per lamp.

New York, N.Y.—New York City has increased the number of arcs from 19,430 to 19,634 the rates remaining the same except in the case of the 475-watt single flaming arcs where there was a decrease in price of 4 per cent. The number of incandescent lamps changed from 18,734 to 21,185 the rates remaining practically the same. Provision has been made to change the series incandescent lamps to the new non-vacuum lamps of 70-watt size.

Worcester, Mass.—Worcester, Mass., has installed 500 6·6-ampère luminous arc lamps⁶⁸ at distances of from 80 to 125 feet. (24·38 to 38·1 m.)

Boston, Mass.—In Boston⁶⁹ there has been a reduction of 14·8 per cent. in the cost of arcs, while Brookline⁷⁰ has made a beginning towards improved illumination by installing 45 luminous arc lamps.

France.—Abroad gas lighting maintains its popularity as a street illuminant.⁷¹ In Paris in particular high pressure lighting has been making considerable gains as may be seen from the following table:—

NUMBER OF LAMPS.

Year	500 c.p.	1,000 c.p.	2,000 c.p.	4,000 c.p.	Total.
1910 ..	—	7	68	29	104
1911 ..	—	7	305	68	380
1912 ..	—	38	315	117	470
1913 ..	16	193	875	159	1,243

Great Britain.—High pressure gas lighting has also made gains⁷² in England, and at Edinburgh, Scotland, an experimental installation of 16 lamps has been made. These have replaced 36 of the ordinary type. They are lighted and extinguished automatically and several have been provided with two burners, one of which is extinguished at midnight.

⁶⁸ *Elec. World*, June 27, 1914, p. 1482.

⁶⁹ *Elec. World*, March 25, 1914, p. 685.

⁷⁰ *Elec. Rev. & W.E.*, November 27, 1913, p. 1010.

⁷¹ *Jour. Gas Lt.*, June 16, 1914, p. 776.

⁷² *Jour. Gas Lt.*, October 14, 1913, p. 140.

⁶⁶ *Elec. World*, January 24, 1914, p. 196.

⁶⁷ *Elec. World*, January 24, 1914, p. 212.

At Leeds, England,⁷³ the high pressure system is to be extended. Glasgow has been extremely progressive on the street lighting question,⁷⁴ and there has been since 1895 an increase in the number of gas lamps from 13,672 to 106,684 while electric lamps have been introduced to the number of 5,116. An interesting development in Glasgow,⁷⁵ has been the taking over by the municipality of the lighting of those private streets, closes, stairs, etc., which have been taken care of by private interests since 1866.

In London, 430 arc lamps have recently been added to the square mile embraced in the original city.⁷⁶ A distinctive feature of the globes is the inclusion of a dioptric lens to aid in the distribution of the light horizontally and downward.

Italy.—A pretentious program has been started in Turin, Italy,⁷⁷ where over \$500,000 have been appropriated for improved lighting. For the main streets approximately 3,000 flaming arcs are to be provided, while the side streets will be lighted by incandescent lamps.

Specifications.—The question of street lighting specifications has been a prolific source of argument and difference of opinion for some years. A recent extended discussion in England⁷⁸ served only to emphasize the lack of unanimity on the part of lighting engineers as to just what the requirements are for satisfactory street illumination. The problem has been attacked in this country⁷⁹ by a committee appointed by the National Electric Light Association and the Association of Edison Illuminating Companies along lines somewhat different from those previously employed. It was assumed that the fundamental purposes to be served by street illumination are :—

1. Discernment of large objects in the street and on the sidewalk.
2. Discernment of surface irregularities in the street and on the sidewalk.

3. Good general appearance of the lighted street.

Two actual streets were equipped for observation under working conditions and comparative tests have been developed to determine in these streets which of two streets lighting systems serves each of the above-mentioned purposes the better. In the past, tests of street lighting have been confined almost exclusively to photometric measurements either on horizontal or vertical planes or both. In the tests in question, observation was made the principal point of comparison, but complete photometric data were also obtained comprising the candle-power of the illuminants and measurements of the horizontal and vertical illumination and of brightness. Eight series of observational tests were made using as many as twelve observers who both riding and walking recorded their judgment on such questions as ability to see the faces of people met on the sidewalk, irregularities in the pavement, obstructions in the roadway, ability to read print, tell time, etc. The final results have not yet been obtained.

Public interest.—That the public is beginning to recognize the desirability of good lighting is indicated by the recent action of a club,⁸⁰ in one of the large cities, which appointed a committee to investigate the question of street lighting and make recommendations to the city council.

In another city a "Municipal Lighting Day" was held at the State University⁸¹ for the benefit of city officials throughout the State and for others interested in the conduct of municipal affairs. This included lectures and demonstrations on the subject of street lighting.

Exterior Illumination.

The satisfactory results obtained in the artificial lighting of tennis courts has caused a considerable extension of this form of lighting. In England⁸² covered tennis and squash courts have been artificially lighted, both with high pressure gas units and electric lamps.

⁷³ *Jour. Gas Lt.*, October 14, 1913, p. 169.

⁷⁴ *Lt. Jour.* (London), May, 1914, p. 230.

⁷⁵ *Ill. Eng.*, (London), May, 1914, p. 228.

⁷⁶ *Elec. Rev. & W.E.*, July 28, 1914, p. 131.

⁷⁷ *L'Electricien*, March 28, 1914, p. 203.

⁷⁸ *Elec.*, May 8, 1914, p. 179.

⁷⁹ Report Committee on Street Lighting—National Electric Light Association, June, 1914.

⁸⁰ *Elec. World*, January 31, 1914, p. 368.

⁸¹ *Elec. Rev. & W.E.*, February 14, 1914, p. 339.

⁸² *Elec. Eng.* (London), February 19, 1914, p. 101.

The value of light seems to be more and more appreciated in every walk of life. An experiment in the use of artificial light to increase the output of a poultry farm⁸³ has resulted in a reported increase of 30 to 40 per cent. in the number of eggs laid. In the case of young incubated chicks, the use of light made them feed longer and thereby accelerated their growth during the winter months by a third.

The growth of aeronautics has created the need of properly illuminated fields for rising and descending at night,⁸⁴ and various suggestions have been made and experiments tried to determine the most suitable method. A need has also arisen for illuminated signals and signs so that an aeronaut travelling at night may determine his location and avoid dangers in descending. In the case of signal lights on the machine themselves, it is evident that arrangements must be made to indicate not only the direction of travel in a single plane but also whether a rise or drop is contemplated.

It is interesting to note that the Port of London Authority has recently equipped the dock policemen with electric torches⁸⁵ to take the place of the old-fashioned oil lanterns.

The logical development of the animated sign⁸⁶ has made its appearance in the use of moving vehicles carrying highly illuminated displays.

The lighting of Christmas trees in the home⁸⁷ is a custom almost if not quite as old as the use of the tree itself. A recent innovation adopted by many American cities at the last holiday season consisted of out-door "community" trees, in all of which illumination was a conspicuous feature of the ornamentation.

In regard to display lighting in general there has been a decided increase in the number of buildings lighted on the exterior for display purposes. In the past there have been numerous cases of so-called "outline" lighting, in which the lights showed the contours. A new method called "flood" lighting is being introduced in which the exterior of the

building is brilliantly illuminated by sources placed at a distance.

The use of high towers for street illumination purposes was discontinued some years ago. The system has been revived recently for use in lighting railroad yards.⁸⁸ Steel towers 100 ft. (30.48 m.) high and 12 ft. square (3.66 m.) at the base have been placed at 500 ft. (152.40 m.) intervals and equipped with quartz mercury-vapour arc lamps.

Interior Illumination.

Car Lighting.—Interest in improving the lighting of railway coaches and street cars continues⁸⁹ and is apparently growing. Indirect and semi-indirect methods are being studied. In one city twenty street cars have been equipped with three different semi-indirect systems in order to see which appeals most strongly to the public. There is a general recognition that bare lamps are bad and that it is well worth while to use reflectors.

The final report of the Committee on Illumination of the Association of Railway Electrical Engineers⁹⁰ contains among other conclusions that equally satisfactory results may be obtained with either the centre deck or half deck arrangement of the lighting units; best results will be obtained with a spacing not greater than two seats apart. The elaborateness of the tests and the expense involved are a most gratifying tribute to the importance attached to better lighting in trains.

Store Lighting.—That the educational efforts of this society⁹¹ are continuing to bear fruit is indicated in the lighting installation of a large department store. In this case the window lighting system was worked out with foot lamps and border lamps equipped with movable colour screens, so that the quality of the light could be altered to suit the requirements. The main lighting, of the semi-indirect type, has also a modified colour value. For the trying on of theatrical costumes, the foot lamps and border

⁸³ *Elec. World*, July 11, 1914, p. 85.

⁸⁴ *Trans. I.E.S.*, January, 1914, p. 25; *Rlwy. Elec. Eng.*, November, 1913, p. 249, and December, 1913, p. 264.

⁸⁵ *Report of Comm. on Illumination of Assoc. Rlwy. Elec. Eng.*, 1914.

⁸⁶ *Elec. World*, May 24, 1914, p. 1134.

⁸³ *Elec. World*, December 27, 1913, p. 1330.

⁸⁴ *Licht u Lampe*, October 23, 1913, p. 838.

⁸⁵ *Ill. Eng.* (London), February, 1914, p. 70.

⁸⁶ *Elec. Rev. & W.E.*, April 4, 1914, p. 656.

⁸⁷ *Elec. World*, January 3, 1914, p. 28.

lamps are not only provided with means for colour modification, but also with dimmers and a spot light is likewise available.

In order to eliminate the annoying reflections from the glass of show windows, a new system has been devised in which the window pane is made concave inward.⁹²

Another novel application of the indirect lighting system has been made in the case of banks⁹³ where the lamps are contained in troughs along the bank rail over the teller's desks.

School Lighting.—During the course of an extended discussion before the British Illuminating Engineering Society⁹⁴ on the subject of daylight illumination in schools, it was brought out that as a minimum actual illumination on the desk for reading in the schoolroom in full (mid-day) daylight, different authorities recommend from approximately 1 to 8 foot-candles. Among the new suggestions were, the determination of the "sill-ratio," i.e., the ratio between the illumination on the window sill of the schoolroom and that on the desk most remote from the window, as a means of determining the access of daylight into schools; experiments to ascertain how far it is possible by using small models to predict the actual daylight conditions in an interior; and an "indicator-photometer" as a means of signalling when the artificial light should be turned on.

In a later⁹⁵ interim report the following tentative suggestions were made:—

"No place is fit for use in a schoolroom when 'diamond type' cannot be read easily by a normal observer at a distance of half a meter.

"The darkest desk in any schoolroom should receive an illumination equivalent to that derived directly from 50 reduced square degrees of visible sky. In these circumstances the place should receive not less than 0.5 per cent. of the unrestricted illumination from the complete sky hemisphere.

"The windows should be located in the wall to the left of the pupils, and the glass should be carried to the ceiling and

not interrupted by cornice, pillars, or decorations.

"No desk in a schoolroom should be farther from the window wall than twice the height of the top of the glass above the desk surface.

"The ceiling should be white. The wall opposite to the window and the wall behind the children should be lightly coloured from 30 in. (0.76 m.) above the desk level. The wall around or behind blackboards should be somewhat darker than the rest of the room.

"All furniture, desks, and surfaces in the lower part of the room should be finished in an unobtrusive colour, dark shades and black being avoided."

It should be noted that there are some points in these suggestions on which more definite information is desirable, and further work on the subject will doubtless meet this need.

Church Lighting.—There is a growing tendency away from the old belief that the interior of a church should be in a state of twilight illumination,⁹⁶ toward a realization that the church should be made cheerful and that this is to be accomplished by good lighting. For this purpose the indirect lighting method is growing in favour although the lower installation and operating costs, as well as the architects' influence, are responsible for the use of direct lighting in some cases even in new churches.

Picture Lighting.—The proper lighting of pictures has been a vexing problem with illuminating engineers for many years. While it is comparatively easy to see what is required for a single picture, to produce the result not only for one, but many, has taxed the resources of numerous engineers and architects. At a recent Art Loan Exhibition an effort was made⁹⁷ to illuminate the pictures as far as possible by light coming from the right direction and also of the proper colour content. Plain and coloured lamps were used, placed in troughs above and in front of the frames and so arranged that no light was specularly reflected to the eye of the observer.

(To be continued.)

⁹² *Tech. World*, July, 1914, p. 686.

⁹³ *Ill. Eng.* (London), January, 1914, p. 8.

⁹⁴ *Ill. Eng.* (London), January, 1914, p. 15.

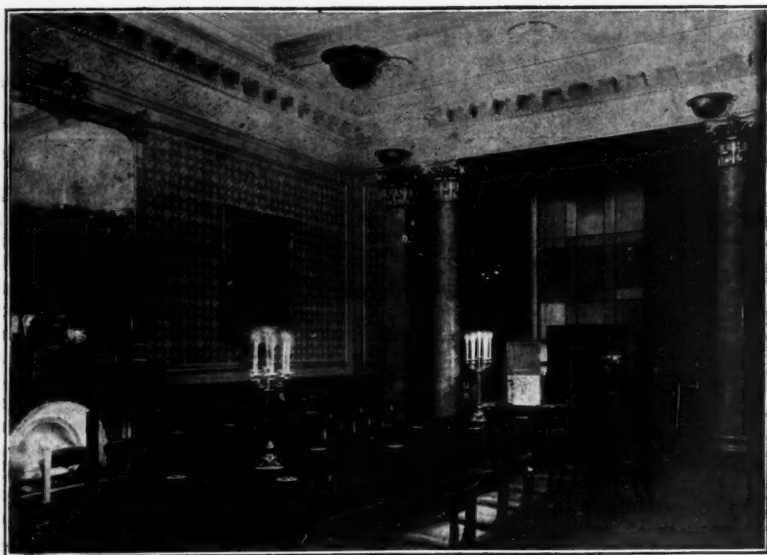
⁹⁵ *Ill. Eng.* (London), July, 1914, p. 365.

⁹⁶ *Elec. Rev. & W.E.*, November 1, 1913, p. 856.

⁹⁷ *Elec. Rev. & W.E.*, December 13, 1913, p. 1127.

THE LIGHTING OF A FAMOUS HALL.

The Dyer's Hall, Dowgate Hill, London, E.C.



Lumina Bureau Photo.

THE lighting of this historic hall is remarkable in several respects. People sometimes speak as though all halls should be lighted on substantially the same principles; for instance, general lighting of moderate intensity over the auditorium, supplemented by stronger illumination by well shaded lights on the platform.

This dictum may apply to halls used for public meetings. But there are many halls belonging to guilds and corporations where historic associations have a controlling influence. The Dyer's Hall is used for Council meetings and occasionally for banquets, and is probably one of the most beautifully proportioned and decorated halls in the City of London.

The ceiling is unique, and the cost of the original design, involving much costly gilding, is said to have been extremely high.

The lighting has accordingly been designed to suit the interior, and in particular to show off the ceiling. Indirect lighting is used, the lamps being concealed in hanging copper dishes. Judging by modern standard the illumination is not strong; with the candles unlighted it does not exceed half a foot-candle.

Owing, however, to the complete absence of glare, and the subtle influence of the surroundings, this subdued lighting does not seem distasteful, and the lighted candles give just that extra stimulus that is needed to avoid a tendency to depression.



TRANSACTIONS

OF

The Illuminating Engineering Society.

(Founded in London, 1909.)

*The Illuminating Engineering Society is not, as a body, responsible
for the opinions expressed by individual authors or speakers.*

ILLUMINATING ENGINEERING IN WAR TIME.

Some Lessons to be learned from the present Lighting of London.

(Proceedings at a meeting of the Society held at the House of the Royal Society of Arts, 18, John Street, Adelphi, London, W.C., at 8 p.m., on Tuesday, December 1st, 1914.)

THE opening meeting of the Session was held as stated above, Mr. F. W. GOOD-ENOUGH being in the chair.

The minutes of the last meeting having been taken as read, the HON. SECRETARY announced the names of members in the usual way, alluding to the acceptance on the part of Sir CORBET WOODALL, D.Sc., M.Inst.C.E., of Honorary Membership in the Society. The Council has also nominated Mr. Thomas Alva Edison an Hon. Member in recognition of his distinguished services as one of the inventors of the incandescent electric lamp.

The CHAIRMAN then called upon Mr. Leon Gaster to open the discussion on "Illuminating Engineering in War Time." In the subsequent discussion the CHAIRMAN, Mr. J. W. T. WALSH, Mr. F. BAILEY, Mr. W. J. LIBERTY, Mr. T. E. RITCHIE, Mr. A. CUNNINGTON, Mr. F. W. WILLCOX, Mr. MACINTYRE, Mr. C. BUSSELL, Mr. F. C. TILLEY took part, and Mr. L. GASTER briefly replied to the various points raised.

In conclusion, the CHAIRMAN announced that the next meeting would be held on January 19th, when a discussion on Searchlights would take place.

NEW MEMBERS OF THE SOCIETY.

THE names of applicants for membership announced at the Annual Meeting on May 21st, 1914, were read again, and these gentlemen were formally declared members of the Society.*

In addition, the names of the following applicants have been duly submitted and approved by the Council, and were also read :—

Hon. Members :—

Woodall, Sir Corbet, <i>D.Sc., M.Inst.C.E.</i>	Governor of the Gas Light and Coke Co., Honorary Councillor and Past-President of the Institution of Gas Engineers, Palace Chambers, Bridge Street, WESTMINSTER, S.W.
---	---

Ordinary Members :—

Ball, R.	Director of Messrs. Julius Sax & Co., 24A, High Street, LONDON, W.C. (2).
Callow, S. H.	Messrs. Siemens Bros. Dynamo Works, Ltd., Tyssen Street, Dalston, LONDON (3).
Louis, Prof. D. A.	123, Pall Mall, LONDON, S.W.
Pinkney, W. F. T.	Chief Engineer, Lighting Dept., Electric Supply Co., NEWCASTLE-ON-TYNE (3).
Podmore, A. E.	Gas Lighting Engineer, 34, Charles Street, Hatton Garden, LONDON, E.C. (2).
Russell, W. R. M.	Secretary and General Manager, Holophane, Ltd., 1, Trevor Square, Knightsbridge, LONDON, S.W. (2).
Sexton, F. P.	Consulting and Electrical Contracting Engineer to the Tamesco Co., Warwick Lodge, Hampton Wick, KINGSTON-ON-THAMES (2).
Turnham, A. E.	Elec. Contracting Engineer and Lighting Specialist, 12, John Street, Adelphi, LONDON, W. (2).
Widdows, G. H., <i>A.R.I.B.A.</i>	Architect and Surveyor, Derbyshire Education Committee, County Education Office, DERBY (3).

* *Illum. Eng.*, June 1914, p. 316.

RATING OF LAMPS IN LUMENS.

AT a recent meeting of the Committee of Nomenclature and Standards of the Illuminating Engineering Society (U.S.A.), the following resolution was adopted :—

Resolved, that it is the opinion of this Committee—

(A) That the output of all illuminants should be expressed in lumens ;

(B) That illuminants should be rated

upon a lumen basis instead of a candle-power basis ;

(c) That the specific output of electric lamps should be stated in lumens per watt, and the specific output of illuminants dependent upon combustion should be stated in lumens per British thermal unit per hour.

The resolution was approved by the Council of the Society, December 10th, 1914.

ILLUMINATING ENGINEERING IN WAR TIME.

Some Lessons to be learned from the present Lighting of London.

By LEON GASTER.

Introduction to Discussion at the Meeting of Illuminating Engineering Society held at the House of the Royal Society of Arts (John Street, Adelphi, London, W.C.), at 8 p.m., on Tuesday, December 1st, 1914.

INTRODUCTION.

WHEN the members of this Society last met together in May, few of us imagined that before the new session had commenced this country would be plunged into the greatest war it has ever had to wage. By those of us who have aimed at the consolidation of international relations the devastating effect of war is particularly keenly felt. Only last year we were congratulating ourselves on the successful formation of the International Commission on Illumination, and looking forward to other forms of co-operation in the near future. Now much of this work must be laid aside, and we can only wait in patience for the time when the shadow has passed away, and it is possible once more to renew these relations.

It goes without saying that the war is having, and will have, a profound effect on the lighting industry, and my object in introducing this discussion is to point out how some aspects for the present situation affects the Illuminating Engineering Movement, and to consider what service the Illuminating Engineering Society can render to the lighting industry and the nation at the present time.

A number of members of the Society are present in the Regular Armies and the Territorial Forces, various others are actively engaged in the supply of material of apparatus required in the war. In battle to-day light plays a conspicuous part. I would suggest that when the war is over an account of the part played by illumination at the front would be of great interest to this Society. At the present moment it is better perhaps not to discuss these matters in detail. We know, however, that searchlights are

being widely used on land, at sea, and in the air. Flare lights are being used to enable the troops to dig trenches by night, and various forms of portable illuminants (acetylene, oil, &c.) have been employed in connection with transport and hospital work. Besides aiding the work of destruction, light has also been the means of preserving life, in facilitating the search for the wounded, and in making possible operations in the hospital tent which could never have been carried out by the primitive lighting arrangements used in campaigns in times gone by. As a Society we are familiar with the latest developments and applications of all illuminants, and it is probable that the expert advice of many of our members is being utilised in many directions at the present moment.

ILLUMINATION IN CAMP.

The use of light in connection with medical work and the Army Service Corps is well recognised. A particular problem in which the authorities must now be confronted is the lighting of many camps and barracks which are springing up all over the country to house Lord Kitchener's Army. During the past months the problems were not so heavy, as the nights were comparatively short. But during the winter light must be provided to enable the men to enjoy reasonable recreation when the day's work is over. I believe that several members of our Society have been concerned in work of this kind, and it is obvious that the lighting of these large areas in remote districts is quite a special problem.

This matter was recently commented upon in the *Sanitary Record*.* The

* Nov. 13, 1914.

writer pointed out the inadequacy of general rules, such as the provision of a certain candlepower per foot of floor space. It would be better to make provision for a certain illumination according to the use to which the interior is to be put.

LIGHTING OF RIFLE RANGES.

Another important question for the military authorities to consider is the lighting of rifle ranges. Not only in the new armies but in connection with the Volunteer associations this is worth studying.

During the winter it would be useful to be able to practice by night, so as to enable the troops to be out in the open during the short daytime. As for the Volunteer associations, their members for the most part are only free in the evening. Several installations of this kind have been recently described in the *ILLUMINATING ENGINEER*.^{*} The most essential point is the illumination of the targets *evenly* and by means of lights concealed from view, so that there is nothing to distract the eyes of the firing party.

Possibly the above remarks will lead to some members giving an account of their experiences in this direction.

Turning next to the general effect of the war on the lighting industry. Shortly after the commencement of the war the views of a number of gentlemen representative of the industry were invited and published in the *ILLUMINATING ENGINEER*. The general impression seems to be that the industry as a whole has not suffered as much as might have been expected. The demand for what may be termed the "luxury" branches of lighting has fallen, but in some instances this has been counterbalanced to some extent by extra requirements of a military kind.

The question of the maintenance of supplies of necessary materials in the lighting industry, some of which have been hitherto received from Germany or Austria, requires a very exhaustive inquiry. In order to make a complete survey of the situation, it is neces-

sary not merely to examine the present position but to consider the future possibilities in the event of the war lasting a considerable time. I may mention that representations have been made to the proper authorities with a view to avoiding any possible shortage.

LIGHTING OF LONDON'S STREETS IN WAR TIME.

The unusual lighting conditions prevailing in London and in various other localities have naturally been much discussed. These conditions are generally understood to be imposed as a precaution against possible raids from hostile aircraft, and naturally we as a Society must loyally accept the measures which are imposed for our safety. In what follows I do not propose to discuss their object or effectiveness for the purpose in view, but merely the actual lighting problems that have arisen: to see whether we cannot draw some useful conclusions from the very unusual experience of the last few months. Furthermore, while accepting the regulations made, it may be useful to consider the best methods, from an illuminating engineering standpoint, of meeting these requirements.

In considering these measures one would also have to bear in mind how far they are dictated by the desire to economise gas, electricity, or lighting materials (mantles, carbons, &c.), and how far they are designed as a measure of defence.

The most obvious change has been the alteration in the lighting of the streets, which applies also to goods yards, railway stations, and other large illuminated areas visible from above.

In some cases the authorities have contented themselves with simply turning out the majority of the lights, in others special forms of lamps have been installed; *e.g.*, in some streets the flame arc lamps have been replaced by glow lamps with opaque shades, completely screening the lights and directing the illumination on the roadway.

The methods practised are broadly divisible into two classes: (A) diminishing the power and the number of the lamps; (B) covering the lamp-globes with obscuring bands so as to block out the

^{*} September, p. 459; November, p. 522.

rays above and restrict the illumination below. It is obvious that various combinations of these methods might be used to give the same result, as far as the essential object of the changes is concerned, but might, at the same time, be widely different in their results from the illuminating engineering standpoint. For example, the width of the obscuring band has a very material effect on the illumination of the roadway; to the uninitiated it would appear that in some cases the amount of obscuration is unduly high and the merging cone of light very restricted; also that the area illuminated is very much less in some cases than in others. Naturally the practice in this respect may be expected to vary, according to the importance of the locality and the nature of the street.

I wonder whether any member of the Society has had the curiosity to attempt to measure the illumination in some of the main streets in the dark areas between the lamps: it must be exceedingly low in comparison with that prevailing in normal times. It would be a pity if the opportunity were not utilised to take a record of these highly unusual lighting conditions, and I have recently applied for and been granted a permit to take an extensive series of measurements and photographs. Without such a permit, experience shows, it would not be desirable to attempt the feat at the present time.

According to the most recent regulations, permission may be given to turn on the lights to their normal value in case of a fog. As matters stand, it would hardly be possible to do so in many cases, owing to the obscuring of the lamp-globes; this points to the desirability of having alternative methods of lighting—e.g., some lamps unscreened, which are unlighted under ordinary conditions but could be turned on in a fog; or small candle-power glow-lamps as adjuncts to the arc lights and used instead of them (as is done even under normal conditions in some streets late at night).

I can recall several cases of streets lighted by incandescent electric lamps, a considerable proportion of which have been completely removed. Needless to say, in case of fog there would be some trouble in bringing the light back to its

normal condition, since it would be necessary to send round men to replace the lamps that have been taken away.

Speaking generally, the chief point of interest to the lighting engineer is "How far is it necessary to diminish the total amount of light, and how far is it possible to meet the required conditions merely by redirecting the rays?" Public safety, of course, comes first. But granted this, the minimum inconvenience would naturally be caused by the latter method. An observation of the present conditions leads one to suppose that it might be possible, without detriment to the authorities' wishes, to aim at greater uniformity of illumination, at least in the less important streets, and less "spottiness." Besides specific regulations as to the number of lamps to be turned on in certain streets, it might be useful to specify that the unobscured rays should be included within a certain prescribed maximum angle. The greater the permissible angle the less, of course, the inevitable spottiness.

It will be remembered that at the discussion of Mr. Trotter's Paper on the Street Lighting Specification last year the relative advantages of a uniform moderate illumination and an arrangement providing for brighter illumination at certain points, with lower values in between, was discussed. Now we have before us an example of conditions which would never be encountered in normal times—namely, very patchy lighting with an exceedingly low minimum. What conclusions can we draw from our experience? I think it will be generally agreed that the extreme contrast between the comparatively brightly lighted regions and those in obscurity is a drawback, particularly as regards guidance of traffic, and that our present experience confirms the desirability of fairly even illumination.

BRIGHT LIGHTING ATTRACTS CUSTOM.

However, taking the conditions as they are, what is the effect of the diminished lighting? There is now a state of things in the streets of London such as probably has not existed in the last fifty years, and which we may trust, we shall never see again. It would, therefore, be worth while to keep a record of their influence on the public mind and on the transaction

of business generally. Naturally, the matter has been considerably debated in the Press. One finds a fairly general impression that the absence of light has a certain depressing effect, that it tends to keep people indoors at night, thus checking the patronage of entertainments and evening shopping.

In some American cities statistics have been obtained purporting to show that light attracts crowds, and that the most brightly illuminated streets receive the most traffic. It would be interesting if some numerical data could be obtained from well-known stores in London showing how the diminution in light has affected custom. Certainly the change has done more than any event in recent years to bring home to the general public the importance of adequate lighting in the streets.

One result of the diminished public lighting will doubtless be that people will spend more of their evenings at home. The opportunity should therefore be taken to make the interior of the house as cheerful as possible and to see that the lighting is satisfactory and up-to-date. Let us hope that activity in this direction will partially counteract the diminution in lighting out of doors.

EFFECT OF DIMINISHED LIGHTING ON TRAFFIC.

This leads me to another important point—the effect of diminution of light on traffic and in causing possible accidents. Here it would be most useful for future guidance if a careful record of accidents in the streets could be kept. The available data are somewhat difficult to interpret. In some quarters it has been declared that the number of street casualties has considerably increased since the regulations came into force. On the other hand, the most recent official announcement suggests that this is not the case (although the fact that stress is laid on the desirability of special care on the part of motorists shows that the danger is recognised). But it may be pointed out that simultaneous with the change in the light the volume, and probably also the speed, of the traffic and also the number of people using the roadway, have enormously diminished. Moreover, it is obvious that by taking special

care in crossing streets, &c., people can avoid to a great extent accidents which would certainly occur if they went about their business in the ordinary manner. Therefore it should not be too readily assumed that the diminished lighting has had no effect, and could be permitted in normal times: whatever the number of accidents, it has certainly slowed down business, and would be intolerable in ordinary circumstances. Also there must be a limit in the reduction of illumination below which even great care would not avoid mishaps, and it is a question whether we are not nearing this limit at the present moment.

Again, it is well known that even in ordinary times the use of excessively bright headlights on motor-cars has been condemned as leading to accidents. In the present semi-darkness their danger has become evident, and on many cars the brilliancy has been diminished by inserting paper screens in front of the lenses. This is hardly a scientific method, since it practically destroys the value of the headlight for illuminating the roadway; a preferable plan would be to screen the lens in such a way as to restrict the rays below the horizontal. The chief thing is to prevent the stray rays striking and dazzling the eyes of people in the roadway.

Previous to the war attempts had already been made to improve the design of headlights and particularly to avoid those dazzling conditions which are occasionally met with and which may be a menace to the safety of the public. It is possible that the experience gained at the present moment may lead to permanent and more thorough regulations on this point.

GENERAL IMPRESSIONS OF THE PRESENT STREET LIGHTING.

It would be interesting to hear the impressions of those present as to the value, from an illuminating engineering standpoint, of the system of screening the lights at present in vogue. Is any modification of this method likely to find favour when once more we return to ordinary conditions? It has often been urged that the glare from modern street lamps is a decided drawback, and that a much better visual effect would be obtained if

these were screened from the eye. It has been suggested that the glare from modern powerful street lamps has sometimes been responsible for accidents, just in the same way as the dazzling effect of motor-car headlights is apt to be. This point has come before the notice of the authorities in times of peace, but has not perhaps been appreciated at its proper value. Now that they have had the experience of an entirely different variety of street lighting, their views as to what constitutes good illumination in the streets may undergo modification.

Possibly, too, the present conditions may reconcile the public (which has hitherto obstinately clung to the tradition of glare) to a milder method of illumination, and that screening with some form of translucent reflector may meet with approval. In order to avoid offending the eye, it would not of course be necessary to screen the lamps anything like so completely as at present, and provision could be made for sufficient light to pass upwards and sideways so as to illuminate the buildings at the sides of the street. A characteristic of the temporary method of lighting now in use is that practically *all* the available light is directed on the roadway and pavement. I think it will be generally agreed that from an æsthetic standpoint the method is not a success.

REDUCED LIGHTING IN PUBLIC VEHICLES.

Yet another change during the last few months has been the diminution in the amount of light in public vehicles. A few months ago we had a discussion before our Society on the lighting of tramways and railway carriages; it was pointed out that good illumination is now an effective method of attracting travellers. It would be interesting to know whether one could trace any distinct diversion of traffic to the underground railways—almost the only place where the illumination is “as usual”—while those who use the buses and the tram-cars travel in a dim and religious light.

There is need for some judgment in the means adopted to reduce the light in these public vehicles. Here again the illuminating engineer is inclined to ask whether it is inevitable to cut down the

light as a whole by obscuring lamp bulbs with blue lacquer, or whether it would not answer merely to equip lamps in suitable shades leaving enough light to read by, and yet rendering the vehicles sufficiently indistinguishable by night. The arrangements in some of the tramcars have been modified lately, and there is some indication of the acceptance of this idea.

SHOW-WINDOW LIGHTING.

The next point that deserves attention is the effect of present conditions on the lighting of the shops. Presumably there is no objection to a merchant illuminating the interior of his shops as brightly as he pleases, so that in this branch of work, apart from the natural depression in trade caused by the war, there should be no obstacle to illuminating engineering continuing as usual.

As regards the window lighting, the chief point of interest is that the recent regulations are driving entirely in the direction advocated by us for other reasons. It has been consistently pointed out that the finest effects in shop-window lighting are to be achieved by treating the window like a stage, where the brightly illuminated objects are made the chief points of interest and the lights themselves are concealed. When I advocated this method many years ago some criticism was expressed by the owners of several large stores. The misunderstanding apparently lay in the assumption that the screening of lights would mean a less satisfactory illumination—which of course is not the case. At the present time this method is employed by most of the leading stores of London, and time has shown the correctness of the views expressed at that time, which are now endorsed by the leading contractors.

I think it may be said with some certainty that a merchant who relied entirely on this principle of concealed lighting should not now find himself obliged to alter the lighting of his windows to any great extent; perhaps in the case of wide streets the upper parts of the windows have to be masked or the canopy let down so as to screen the window from above without interfering with its being seen from the pavement.

On the other hand, the merchant who has relied on exceedingly bright lamps placed in the window suffers for his neglect of the principles of illuminating engineering. The authorities have required that such lights should be screened, and also that powerful lamps outside the shops should be covered by screens which cover the lamps from view and prevent any large amount of light falling on the pavement. In this respect they are merely carrying further the practice in the City of London, where there has been for some time a regulation that such lamps should be screened on the side facing the roadway. In this respect, therefore, as in the case of streetlighting, the present regulations are, to a certain extent, in the same directions as the recommendations of our Society, though doubtless carried to a point which would hardly be desired in times of peace.

Naturally the present regulations have had the effect of practically eliminating what is known as "parade lighting." In some cases the lamps employed for parade lighting are so powerful that some means of softening the light might be encouraged even in times of peace. But the chief thing to be guarded against, to my mind, is the sudden change from a comparatively low illumination to a brilliantly lighted area; such abrupt changes might be avoided by "grading the lighting," i.e., by using lamps of progressively increasing candle-power so that the change in illumination is not so sudden.

A walk round any of the streets of London just now reveals an extraordinary diversity in the appearance of shops, and in the means adopted to comply with the police regulations. Almost invariably the outside lamps are extinguished. Lamps in the window are swathed in varied degrees of opacity and colour; in some instances the fact that the bare lamp-bulbs have been tinted blue is apparently accepted as complying with the requirements of the authorities. Needless to say, these amateur efforts result in very indifferent window lighting, and it may safely be said that in most cases it would pay the merchant to adopt concealed lighting in preference. It is to be noted that various firms have rightly taken the opportunity to urge the advisa-

bility of methods of this kind, and at the present moment there should be a demand for such methods of conversion.

It is quite obvious that the problem of deciding when and how lights should be diminished is an exceedingly difficult one for the ordinary police constable to determine, and it seems reasonable to suppose that the help of some members of our Society, who are accustomed to dealing with problems of this kind, would be of value to the authorities. It would perhaps be desirable to have a rough standard of permissible intrinsic brilliancy. Past experiments with searchlights have shown, however, that the connection between the brightness of an object and the distance at which it is visible is by no means a simple one: it may be questioned, for example, whether merely colouring a lamp-bulb or surrounding it with crinkly tissue paper is a very effectual method of making it less conspicuous from above.

The use of concealed methods of lighting should surely be encouraged and it seems reasonable to suggest that a general recommendation on these lines would go far towards supplying a simple rule for merchants to follow. If, in addition, some limit to the illumination is necessary in order to avoid undue lighting of the pavement it should not be very difficult to frame an additional recommendation on this point for the guidance of contractors. There does seem a need for some more explicit recommendations which could be generally adopted and which would leave as little as possible to personal interpretation. If there is to be a penalty for non-compliance with official recommendations the consumer and the contractor should be given definite information as to what is permissible and what is not. This applies particularly strongly to new installations which will have to be designed in such a way as to meet the present conditions.

ILLUMINATED SIGNS.

Somewhat similar considerations apply to illuminated signs. Naturally the first step of the authorities has been to extinguish the giant signs (such as those on the Embankment) which form such conspicuous landmarks, but care should be taken that a regulation of this kind does not assume too arbitrary a character:

there are many mildly luminous and quite inoffensive small signs which should not be included in the above category.

The use of an illuminated fascia carrying the name of the shop or an advertisement should also be considered. It may serve to screen the lamps which are placed at the top of the window, and, provided the brightness is not much above that of the contents of the window, there would not seem to be any objection to this form of transparency sign. But in any case the existing regulations could be complied with by merely using some form of silk shade for the time being.

As regards large signs of the kind referred to above, one may sympathise with the view that many of these huge advertisements are inartistic. Some of these signs have been placed in undesirable positions, and do not add to the beautification of London. Their extinction at the present moment is not entirely a cause for regret. Possibly the effect of the present conditions may be that they will in future be restricted to certain areas. But those artists and architects who have described these signs as "eyesores" should recognise the duty of educating the public to appreciate the artistic possibilities of the illuminated sign.

The whole question is one of extreme importance to the merchant in London, and it is considered that the present measures, however necessary for safety, have a crippling effect on trade and a depressing effect generally. It is therefore worth while to take pains to render the measures now being taken as little onerous as possible. Seeing that our Society includes representatives of all sections of the public—makers of lighting appliances, sellers of gas and electricity, and the consumer—we are vitally interested in the matter, and it occurred to me that a discussion might give rise to some useful suggestions.

Although the changes in lighting have inevitably been productive of some inconvenience we must of course acquiesce in measures which are considered desirable in the interests of public safety.

Meantime we may expect that some ultimate good from the illuminating engineering standpoint will result. I may conclude by a brief summary of the chief points suggested in this contribution.

(1) Present circumstances have brought home to the public the vital importance of good illumination. After having experienced such a fundamental change the authorities may be more disposed to make experiments in the future; the public should appreciate better the need for expert guidance and recognise the valuable services so far rendered by our Society.

(2) After the war is over we may not revert to exactly the same methods as were previously employed; greater attention should be paid to the screening of public lamps with a view to avoiding glare, and the importance of a fairly uniform illumination will be better understood.

(3) Present experience is demonstrating the importance of carefully designed public lighting in the interests of traffic. Excessively brilliant headlights on motor-vehicles are recognised to be inconvenient, and may possibly be restricted when we return to normal conditions.

(4) The attention of merchants has been drawn to the benefits of good shop-lighting. An impetus has been given to "concealed window lighting," and the effect should persist afterwards. Meantime there seems a need for some more explicit advice as to what is permissible. The Illuminating Engineering Society might be of service to the authorities by preparing some suggestions as to how the official recommendations can best be complied with.

(5) The extinction of some of the more prominent illuminated signs has been, from the artistic standpoint, an advantage. It may be decided to make some restrictions as to the nature of such signs, and the localities in which they are permissible, and attention should be given to the preparation of illuminated signs for many purposes and of a more artistic kind.

ILLUMINATING ENGINEERING IN WAR TIME.

DISCUSSION.

The CHAIRMAN, speaking with regard to the letter, a copy of which Mr. Gaster had put upon the screen, said this only pointed out that a limited amount of lighting could be used in the interior of shops after 6 p.m., but from the lantern slides shown by Mr. Gaster it would seem that there were a great many examples of interior lighting which would not be allowed by the police under the present regulations. In these illustrations it was very noticeable that although the lighting was entirely inside, nevertheless the pavements were brilliantly illuminated by the reflection of the light from white articles, mirrors, etc., in the windows. Harrods was an example of this, and he believed they had been compelled by the police to screen, very materially at any rate, the upper portion of the illumination of their windows. The trouble was to know exactly what the authorities would pass and what they would not pass.

He would like to emphasise what Mr. Gaster had said—namely, that the object of this discussion was not in any way to criticise what the authorities had thought it necessary to do for the protection of London. That was certainly not their province, and the Council would feel that it was very much out of place if any criticism of the Admiralty or War Office was made in the present critical times. We all might have our own opinions as to the likelihood of Zeppelins coming here, and we also had a pretty good idea of the sort of reception they would get if they did come, but if the darkening of London was going to save lives in any circumstances then those who supplied the illuminant certainly would not be found to raise their voice against any regulations made by the authorities.

All we wanted to find out was what was permissible and what was not, because there was not, at the present time, very great uniformity in the instructions on this point. There was a variety of police practice in different parts of London, and if, as the result of this discussion, it was possible to make suggestions to the

authorities which would bring about the result aimed at whilst enabling the traders of London more effectively to illuminate the interiors of their shops, it would not have been a useless one.

Two of the illustrations shown by Mr. Gaster were of the showroom of the Gas Light and Coke Co. at Edgware Road, where they had succeeded in meeting the requirements of the police whilst not diminishing the illumination inside.* That was achieved by putting reflector lights close to the glass high up in the windows and also low down in the windows and covering the glass for a considerable area in front of the lights both above and below with blue paper. The result was that no direct rays of light whatever fell on the pavement outside the shop window and very little reflected illumination escaped, and that only horizontally, so that the pavement was entirely in gloom. The result was rather effective from the shopman's point of view, because it gave something of a peep-show effect. There was a broad band of obscure window above and below with plenty of light at the eye level for people to look into the shop. This idea had been followed out by other shopkeepers, and the police were very satisfied with it.

With regard to Mr. Gaster's suggestion that a careful record of accidents should be kept, it would be very necessary to differentiate between accidents in the day time and those occurring after lighting up, because statistics could be very misleading if they did not give all the factors in the situation. Undoubtedly at the present time greater care was being taken by drivers and greater care was also being taken by people to be "quick" rather than "dead," and these factors alone rather tended to vitiate any statistical comparisons that might be made with what had happened in the past in normal times. He was afraid he could

* This window was illustrated in *The Illuminating Engineer*, Dec. 1914, p. 567.

not agree with Mr. Gaster that the glare from modern powerful street lamps was responsible for accidents. He was not aware of any instances of street-lighting in London, either by gas or electricity, which could be said to be dazzling in their effect, either to pedestrians or drivers. He did not know if anybody could say whether Selfridge's had had to reduce the amount of interior lighting used for their windows. In this case the lighting was entirely concealed, but at the same time it brilliantly illuminated the pavement outside the shop.

With regard to outside lamps, these were not used merely for lighting the goods in the windows, but were used very largely, as Mr. Gaster had indicated in his photograph of the Lewisham High Road, for the purpose of directing the public to the road at night-time, because this brilliant illumination made night-shopping a pleasure and also perfectly safe. As to the suggestion that in this class of parade lighting the illumination should gradually work up to a maximum and then dwindle down again, he was afraid that the shopkeepers at the beginning and end of the parade would not welcome the suggestion, as the lamps outside their shops would be considerably less powerful than outside the shop of the man halfway along. He was afraid there would be a distinct practical objection to that theoretical suggestion.

He hoped the result of the discussion would be some practical suggestions which could be placed before the authorities which would assist them as well as assist the tradesmen. He believed there was a representative from the Office of Works present which had control of this matter on behalf of the Admiralty. Possibly it might be too much to ask him to take part of the discussion, but any remarks he felt at liberty to make would be listened to with great interest by those present.

Mr. J. W. T. WALSH (National Physical Laboratory) spoke upon the question of glaring motor-car head-lights, and apologised for the absence of Mr. Paterson, who had gone into this matter a good deal at the National Physical Laboratory. Recently, he said, we had seen such devices as the swathing of motor-car head-

lights in tissue paper or some other translucent material. One patriotic motorist he had noticed had used Union Jacks for this purpose, with the result that from the driver's point of view the head-light was reduced to the efficiency of an ordinary bicycle lamp.

Mr. Gaster had suggested that the head-light beam should be kept below the horizontal. Surely he must mean *above* the horizontal, but even so the suggestion, he thought, was a little too sweeping, because it was clear that the portion of the beam which would tend to dazzle anyone approaching a motor-car—provided he were on his own side of the road—would not be the whole upper portion of the beam but only that segment of it which lay to the driver's right-hand side. Any device, therefore, which would result in cutting down this right-hand top segment would entirely screen from dazzle anyone approaching the car provided he kept to the left of the road. It had been found possible to adapt both acetylene and electric light sources so as to produce head-light beams in which this right-hand top segment was entirely eliminated, and the slide which he showed illustrated the effect produced.



This particular photograph was taken with two motor-car head-lights which together over the main portion of the beam were equivalent to 1,400 candles. In the obscured segment, however, this

intensity was reduced to 14 candles without any appreciable diminution of the light produced over the remainder of the beam. Another device had been found useful by Mr. Paterson in connection with the suggestions made at various times that brilliant head-lights should be wholly diminished when driving through towns. This consisted of a small metal screen placed between the source of light and the mirror so as to render inoperative either the whole or any portion of it which might be desirable. By this means the intensity of the beam could be reduced at will without sensibly affecting its directiveness.

Mr. F. BAILEY (City of London Electric Lighting Co.), speaking of his experiences with the street lighting of the City of London, said he had found it was not an easy matter to screen arc lamps at short notice. In the case of the City, he had to screen a large number of lamps so that the light did not illuminate the sides of buildings for more than six feet from the ground. In order to accomplish this he painted the top of the globe, but having in view the possibility of fog and the need for suddenly increasing the illumination considerably, he succeeded in convincing the authorities that it would be better to leave a number of lamps with clear globes and only light them in case of emergency. Unfortunately fogs did not come as frequently as the supply authorities might desire, and therefore there had been very little opportunity of trying the effect. Consequently, as might be well known to many, those lamps which were not in use developed eccentricities due to the effect of rain and condensation, with the result that a series of faults had occurred which rendered it unwise to rely upon the lamps for emergency. The only alternative was to dry them out by running them in the daytime, and this had brought down upon him much unkind criticism to the effect that he did not know what he was doing and was wasting current.

Undoubtedly the present lighting of our streets was producing a feeling of gloom and depression which would remain in the memories of all those who had to endure it, for the rest of their lives. Personally, he could not help feeling that it must have a good effect upon recruiting

because he could not imagine anyone staying in London under its present conditions when they could have a very much better time at the Front.

With regard to the lighting of rifle ranges, perhaps Mr. Gaster was referring to miniature ranges, but it occurred to him that outside full distance ranges might also be treated in the same way. With miniature ranges there was not much scope for invention, but it was astonishing how badly lighted they were. He had given some attention to the matter in connection with a miniature range which had been set up for his work-people, and it added considerably to the cheerfulness of the men using the range. Generally these ranges suffered from too much gloom at the firing line and too much brilliancy in front of the target. That gave a bad impression. The lighting of full-sized ranges should have the effect of enabling men to become efficient much more quickly and it should not be too costly to have two sources of lighting, one for the targets and one for the firing line.

Mr. W. J. LIBERTY said it was remarkable how people had become "acclimatised" to the reduced quantity of lighting in London. As to accidents, records were being kept, and it might be interesting to know that in the City of London accidents had been less; in fact, there had not been one collision at any "rests" within the last three months. In the City of London the normal lighting was something like $1\frac{1}{2}$ million c.p., having been recently increased from about 688,000 c.p., but at present they had dropped the million and gone down to the quarter. The effect of the reduced lighting in obscuring London was such that from the dome of St. Paul's at midnight it had been quite impossible to locate certain spots. This gives an idea of the effectiveness of the scheme, and the change had been accomplished during the short interval from the receipt of the instructions at 11.30 on the same morning.

As things were now, there was no need to fear fogs because he believed the authorities had everything in readiness, as had been mentioned by Mr. Bailey. Various methods had been suggested for bringing about this result, and it was most easy to accomplish where central

lighting was adopted, the circuits being so arranged that the lamps were in alternation, the shutting down of half the circuits put every other lamp out; these were left unshaded and in time of fog the "idle" circuits were put into lighting; this with shaded lighting was found effectual so far as the white misty fog that they had yet experienced.

There were various methods in different localities for reducing the public lighting. Some authorities had taken great blocks of lighting away altogether; in others alternate lamps had been extinguished, and where lamps were staggered across the road the result was the putting out of one side of the road entirely, the other side with the lamps all in. In the inner ring of London with central roadway lighting it was easy to adopt the method of having every other lamp extinguished. It was necessary to go back 50 years to find street lighting down to anything like the present level, when flat flame burners, consuming five cubic feet per hour and giving $2\frac{1}{2}$ candles per cub. foot of gas were in use, but although smaller units than those now used were employed, the lamps were then placed closer together, so that there was not the spottiness that was now noticeable.

After all, so far as the supplies of the illuminants were concerned, the public lighting was not of the greatest importance, seeing that it represented only about five per cent. of the total output. Interior lighting, however, was the question which was most concerning shop-keepers and others, and he believed it had been the general impression that they could not have anything like the normal lighting at any time. This, however, was not the case and the Society might take steps to bring it before shop-keepers that they could have all their interior lights going from 3 or 3.30 until 6 o'clock, this giving them at least $2\frac{1}{2}$ hours' good lighting. This knowledge might be of considerable value having regard to the approach of Christmas and the school holidays. Shopkeepers did not seem to be aware of this, although it was mentioned in the last order issued. If it could be brought to the notice of the shopkeepers as an outcome of this meeting, by the Council of this Society, it would add to the cheerfulness of the

streets during the busy period and would cause people to come out on "shopping bent," and would mean a great deal in the way of spending and of trade and tend to keep the financial wheels going round. With regard to illuminated whiskey signs, he did not believe one noggin less of whiskey had been drunk as the result of putting these signs out of use, and from the æsthetic point of view he did not think many people would regret if they were not lighted again.

Mr. T. E. RITCHIE pointed out that the authorities had to deal with the present lighting of London, not so much from the standpoint of the man on the ground level as from that of the man far above the ground. He did not think that much progress in increasing the amount of light would take place until there were available records of the very careful and systematic work in this direction now being made. He believed, however, that it would be found to be distinctly better to adhere to a moderate value of illumination and a reasonable degree of uniformity, rather than the extraordinary spotty effect which prevailed at present.

Particulars had been asked for as to measurements of illumination at the present time. There was one case he could mention, that of a shopkeeper whose lighting was objected to owing to reflection upon the pavement in front of his window. This illumination at this point was found to be $1\frac{1}{4}$ foot-candles; yet, not far away, there was a very brightly lighted patch under a lamp, the average of which was nearly 16 foot-candles. If, as Mr. Bailey had said, the instructions were that no building should be lighted for a greater height than six feet above ground he could not understand why an objection was taken to this relatively low illumination of $1\frac{1}{4}$ foot-candles, since, in any case, the width of the roadway would be defined if the buildings were lighted.

He might also mention one very practical system of street-lighting according to which ten-ampère flame arc lamps are being arranged on alternate circuits so that every other lamp could be switched on. Instead, however, of blacking the upper portions of the globes, arrangements were made for the light

from each lamp on one circuit to be reduced by half; in this way it was possible to have every alternate lamp on full power or half power. The system had the desirable quality of flexibility without impairing the efficiency of the lamps, although, of course, the total current consumed was less.

Mr. J. MACINTYRE (H.M. Office of Works) said it was naturally impossible for him to say much in a general discussion in regard to street lighting regulations, but he had profited by the discussion and hoped that to the same extent his department would also profit.

One matter which had interested him in a private capacity was the lighting of rifle ranges. Anyone who had experience of shooting rabbits at dusk knew that in these circumstances a man who was ordinarily a splendid marksman would often prove a complete failure. At the Front it would often be necessary to shoot in the twilight or even in the dark, and it was therefore questionable whether men trained in their firing at perfectly illuminated ranges would turn out the best shots under war conditions.

He agreed that when the order came for turning up the lights once more it would be a pity to revert to the old methods completely. The present was a favourable moment for considering what improvements could be carried out, and certainly in many cases there was room for improvement.

Mr. A. CUNNINGTON (London & South Western Railway) said he had been concerned in dealing with goods and shunting yards under the present abnormal conditions of lighting.

The difficulty in connection with such areas was that a considerable amount of light was essential to the working of the traffic, and they had to adjust the lamps so as to avoid on the one hand serious congestion of the yard and on the other providing a conspicuous mark for hostile aircraft.

It was at first thought sufficient to screen the lamps from above, but aerial patrols reported that this was not sufficient, and finally the light was reduced to a zone subtending about 45 degrees, 35 degrees being obscured at

the bottom and 10 degrees below the horizontal. So far as he knew this was quite satisfactory to the authorities and it enabled the work to be carried on, for although the average horizontal illumination was about one-tenth what it was before, the effective lighting, *i.e.* vertical illumination at the top of the trucks, was not materially reduced. Incidentally this showed that minimum horizontal illumination was not a good criterion for the lighting of goods yards. As the result of illumination measurements made under the present conditions he had found many spots where the horizontal illumination at three feet above ground was too low to be accurately observed, and yet shunters were able to work by the light falling on the top edges of trucks and vans.

Mr. Gaster had referred in his paper to the reduced lighting in public vehicles. In this connection he had noticed recently in a L.C.C. tramcar that a man was reading quite comfortably with an illumination which he afterwards found to be only 0.5 foot-candle. This might seem low in comparison with the value of two to three foot-candles for reading suggested in a pamphlet of the Illuminating Engineering Society, but further measurements with the Lumeter revealed that the general illumination of the car was only one-fifth of this value, and he believed that it was due to the very subdued light of the surroundings that the man was able to read without straining his eyes. On account of the accommodating power of the eyes, he thought much depended in these cases on the relation between the light on the book or paper and that on the surroundings.

He ventured to suggest that there were many places such as shop-fronts, "parades," and even certain of the main streets of London, where the present reduction in lighting might teach some lessons in better grading of illumination and avoidance of sharp contrasts. He certainly thought Mr. Bailey had exaggerated the terrors of reduced lighting, and he could not agree that the result was so very depressing, especially in the suburbs, where only alternate lamps were extinguished. It was interesting to recall the changes that had taken place in the last 15 years in regard to standards of suburban street lighting. From measure-

ments which he had made in the district in which he lived, where they happened to have every type of street lamp except the flat flame burner, he found the following rough proportions existed. Taking the flat-flame burner, which was the standard 15 years ago, as the unit, upright mantles gave six times as much light, the inverted mantle gave ten times, and electric street lamps (100-watt metallic lamps) came somewhere between the last two. The above figures were for measurements of candle-power at 10° below the horizontal. The normal present-day lighting was therefore about 10 times that of 15 years ago, and so with alternate lamps extinguished we still have five times more light in the streets than in 1900. This showed in a striking manner how greatly the standard of street lighting had increased in recent years.

Mr. F. W. WILLCOX (British Thomson-Houston Co.) referred to the amount of wasted current now caused by the methods of dimming street lamps, many of which, he said, it would be a kindness to put out, as they did not add anything to the illumination. It was a pity there was not more general adoption of the plan used in Oxford Street, where the arc lamps had been dispensed with and incandescent lamps with metal dome reflectors used instead. This plan might almost be used in normal times to cut down the illumination in clear weather, using the arc lamps in foggy weather.

With regard to interior lighting, much more could be accomplished in conforming to the new regulations with harmony to proper lighting effects if correct methods of lighting were used instead of the crude applications so generally employed.

With regard to Selfridge's, he had recently passed these premises and noticed that the windows were as brilliantly lighted as ever. The use of sunshade awnings over each window solved the problem. His general impression was that those shop windows which were best lighted with concealed lighting had suffered the least under the new regulations, as all that it had been necessary for them to do was to use a curtain or shade of some sort to dim the light falling on the side walk or pavement.

Mr. C. BUSSELL remarked on the diversity in practice in lighting streets in the suburbs; for example, in the road where he lived there were only two lights, but in an adjacent road five lights in the same length. There were also roads some distance out of London on which flat flame burners were still in use. The effect of increasing the intervals between lamps was apt to dazzle the motorist, since he came upon the lamp suddenly when his eyes had become accustomed to the darkness.

Mr. F. C. TILLEY said that one good effect of the war must surely be to bring about an improvement in shop-lighting methods in the future as many a shop-keeper who was content in normal times to go on in a more or less old-fashioned way had now been compelled to take a keener interest in the question of properly lighting his shop windows in order to attract the public. He might even feel the necessity of calling in expert assistance to aid him and in this direction the members of the Society could do good work. He did not wish to express any opinion whether the central lighting or side lighting of streets was the best, but those who compare the two methods under the existing conditions would have a good opportunity of judging their relative advantages. He agreed that it would be a considerable assistance to have a definite decision as to the degree of lighting which could be adopted for shop windows and no doubt the Chairman of the Society would do his best to bring the matter before the authorities.

Mr. L. GASTER, in reply, congratulated Mr. Goodenough on the lighting arrangements at the Edgware Road showroom. He thought that, according to the existing practice of the authorities, it might reasonably be expected that adequate lighting would be allowed inside the shop, provided no very brilliant objects were visible from outside and the rays of light illuminated the contents of the window and not the pavement. Doubtless in the case of shops at corners or facing open spaces, &c., the use of an awning might be desirable to screen the lights from above. He agreed with Mr. Willcox that many shops were still very unscientifically lighted, and he thought it

would be found that those that adopted the concealed lighting complied most readily with the authorities' requirements.

With regard to parade lighting, he thought that the conditions he had suggested might be obtained by gradually increasing the illumination as one approached the parade lighting proper. All the shops in the row might enjoy the same amount of light; what he suggested was that the abrupt transition where the parade lighting began and ended should, if possible, be avoided.

It could hardly be denied that there was some degree of glare from certain forms of street lighting. Instances could be mentioned of drivers being dazzled by passing from a comparatively dark street into a very bright one, and accidents have been ascribed to this cause. The fact that in some cities the lighting of side streets was progressively strengthened as one approached a main thoroughfare showed that this possibility was recognised.

He was interested in the description of Mr. Walsh's design for headlights. There seemed to be a misunderstanding as to his (Mr. Gaster's) suggestion, that the beam of light should be confined below the horizontal. Clearly what was required was that the rays of light, after emerging from the lens, should not dazzle the eyes of drivers and pedestrians, and should therefore be kept below the horizontal, as shown in Mr. Walsh's own photograph.

Mr. Bailey and Mr. Ritchie corroborated his view as to the desirability of making the lighting arrangements flexible so that the illumination could be increased in case of fog. He agreed with Mr. Bailey as to the value of good artificial lighting for rifle ranges. Mr. Macintyre had pointed out that men should learn to shoot under trying conditions, for example in the dusk. This was a matter for the consideration of the military authorities. He thought, however, that if artificial light was used on a miniature rifle range it would surely be best to have this light as perfect as possible, especially as these ranges were used mainly for beginners. Experience of trying conditions was best obtained in daylight. He was glad to note Mr. Macintyre's sympathetic remarks with regard to the value of this discussion.

Mr. Gaster added that he wished to congratulate Mr. Cunningham on the scientific methods used in darkening his company's goods yards. The data collected should be of considerable value for future reference.

Mr. Liberty's data for the City of London were interesting, particularly his experience in looking from the top of St. Paul's by midnight. He understood that the present arrangements were considered satisfactory from the standpoint of the authorities; the problem was to meet their requirements and at the same time to dislocate business and daily life as little as possible.

The fact that the changes had been carried out with so little friction showed the forbearance of the police and the willingness of the public to make what sacrifices were necessary. However, he believed that, as Mr. Goodenough had said, the Society could assist the authorities in dealing with these problems, and he hoped that they might be instrumental in framing some more definite rules for the guidance of shopkeepers.

It had also been suggested that some members of the Society might volunteer to advise the authorities in case of any dispute, and personally he was quite prepared to do so.

He thought it would be agreed that the darkening of London was essentially a problem that should be solved by scientific lines. Clearly the measures to be taken in any street, or in arranging the lighting of a particular window, should depend on the local situation. For example, in a narrow street with high buildings it might be possible for shops to be quite brilliantly lighted, provided the illumination of the pavement was kept below a reasonable limit, so that the width of the street could not be detected. On the other hand special measures would be necessary in the cases of a shop at a corner, or facing a wide open space so as to be easily visible from above.

If this discussion led to a more general agreement as to the most scientific methods of shop-lighting and the requirements of street lighting, this alone would be a most useful result, and would justify the existence of this Society as a platform for the discussion of such important questions.

CORRESPONDENCE.

CONDITIONS IN PARIS IN WAR TIME.

THE following is a translation of a portion of a letter received from one of our corresponding members in Paris, describing the present lighting conditions in that city:—

As regards the illumination of Paris, on which you have been good enough to make inquiries, there are a few points that may interest you:—

(1) The lighting has been very much diminished, especially from 8 p.m. onwards, and on account of the closing of shops.

The public lighting in the streets in the centre of Paris is in many cases little more than a half or a third of that prevailing in ordinary times, and the suburbs are even less illuminated. The district round the Eiffel Tower, where I live, is systematically placed in obscurity, notably by the extinction of all the lights in the Champ du Mars. In order to avoid the possibility of the enemy locating the Eiffel Tower during the night the illumination on the bridges over the Seine has even been suppressed and the quays left almost in complete darkness. However, no aeroplane has made its appearance round here by night, and all the attacks have been made in the day time, particularly in foggy weather, such as naturally hampers the constant surveillance of the air maintained by French aeroplanes.

(2) As regards the effects of the war on the lighting industry, these are not very serious. The Société d'Incandescence par le Gaz has great stocks of thoria and ceria, and up to the present can keep pace with the consumption of incandescent mantles. There is also a company at Clichy which can furnish rare earths obtained from the sand from Brazil.

Electric glow lamps are likewise produced in France by many companies which have been engaged in the manufacture of metal filament lamps for several years, and which can produce enough to meet the consumption. Only those companies which are German, or have German connections, have closed their works, and their premises will be shortly placed under supervision.

The situation in regard to carbons for arc lamps is more difficult, because the works of Fabius Henrion (Pagny sur Moselle) and the Société Auer (Mainbottel) are in the territory actually occupied by the Germans. But there still remain stocks in the Parisian branches of these companies, and there are also works at Nanterre and Frouard which are actively engaged in manufacturing carbons, particularly those of the non-mineralised variety.

As regards mineralised carbons, some difficulty may be expected if the war is prolonged; possibly the demand may render necessary the introduction of foreign carbons; but the greater number of the big consumers have diminished their consumption. Many works have closed, the public lighting has been so reduced, and in many cases carbons of a simpler kind are now being used; these facts will help us to cope with the situation. However, the Cie. Parisienne de Distribution d'Électricité has sufficient stocks of mineralised carbons to assure the lighting of the streets during the probable duration of the war, in view of the present diminution in illumination.

The darkening of Paris by night arises not so much from the fact that the lighting has been diminished by a half or two-thirds as from the closing of the shops after 8 p.m. (There is talk

of allowing the cafés to be open up to 10 p.m.) No depression in spirits has been caused by the reduction in light, nor has there been any increase in accidents, owing to the exodus of about one million of the inhabitants at the end of August (of whom the greater part have not yet returned), and the requisition of the omnibuses and a large number of automobiles for military purposes. Thus, while the lighting is diminished the amount of traffic is also very much less.

SHOP LIGHTING IN WAR TIME.

DEAR SIR,

Owing to the police regulations, the subject of shop window lighting has received more attention recently than it has ever done. A walk down any of our leading shopping thoroughfares on any evening will be rewarded by the sight of many amateurish attempts at light diminution. A much-favoured method is the fixing of tissue paper shades round bare lamps—this is not only ineffective from an illumination standpoint, but is a distinct source of danger, as witnessed by the large amount of badly scorched tissue

paper seen. As a result of the lack of illuminating knowledge the results achieved are, more often than not, gained at the expense of practically the total sales-value of the show window itself. Yet it is quite possible to light a window in such a way as to ensure a brilliant light on the goods and, at the same time, avoid glare on the pavement.

The British Thomson-Houston Company, Ltd., have, as you know, had a large amount of experience in shop lighting, both for the inside of the shop and for the show window. Those of our customers who installed concealed lighting *before* the war have had cause to congratulate themselves *since* the war, as they have not been called upon to make few if any alterations in their lighting arrangements.

It is with a desire to assist your readers that I am writing this letter to inform them that they can call upon our illuminating engineers for free advice as to the lighting of windows in an efficient and approved manner.

Yours very truly,

F. W. WILLCOX,

General Manager, Lamp and
Wiring Supplies Dept., British
Thomson-Houston Co., Ltd.

LIGHTING IN WAR TIME.

A FEW INCIDENTS OF THE PAST MONTH.

A NEW order has been issued by the authorities requiring: (1) the extinction of all lights for outside advertising or illumination of shop-fronts. (The uncertainty as to what lights were "powerful" led to the evasion of the order.) (2) That all vehicles should carry a red light in the rear. (In the present conditions of the streets this is necessary to protect vehicles from being run into from behind.)

police have now arranged for six inches of clear glass to be left on the lamps, whereas formerly 3½—4 inches was common. With the present arrangement the rays pass from one lamp to another, thus giving much more even illumination and less of the "spotty" effect.

A new order has been issued in Birmingham containing more definite instructions as to the diminution in light. The order makes special reference to the shading and extinction of street lamps, the turning out of conspicuous sky-signs, the obscuring of lighted roof areas, and the reduction of illumination in trams. In Scarborough "somewhat drastic orders" are also in force requiring the use of blinds in all houses after 6 p.m., and the total extinction of street lamps after 11 o'clock at night.

According to the *Gas World* Mr. A. E. Broadberry has been able to obtain some relaxation of the existing restrictions on public lighting at Tottenham. The



TOPICAL AND INDUSTRIAL SECTION.

— • • • —

[At the request of many of our readers we are again extending the space devoted to this Section, and are open to receive for publication particulars of interesting installations, new developments in lamps, fixtures, and all kinds of apparatus connected with illumination.

The contents of these pages, in which is included information supplied by the makers, will, it is hoped, serve as a guide to recent commercial developments, and we welcome the receipt of all *bona-fide* information relating thereto.]

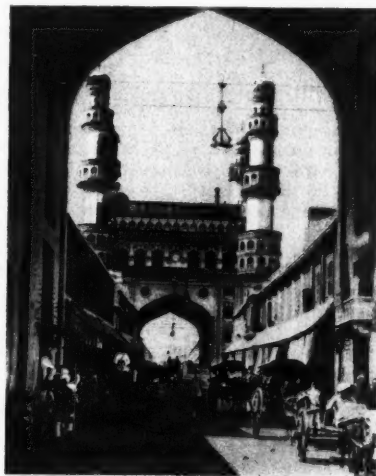


MODERN LIGHTING FITTINGS IN THE EAST.

THE cover of a catalogue (No. 9), issued by the **Wardle Engineering Co.** (Deansgate, Manchester), contains a picturesque photograph, showing the use of the "Barrow" Suspension Device in a large city in Central India. This is one of the most interesting instances we have met for some time of the introduction of modern illuminants in Eastern surroundings. Here we have a characteristic Indian bazaar, which for centuries has relied upon the dim illumination of oil lamps. Now we find the streets lighted by incandescent lamps in a modern way equipped with the Barrow suspension device—an arrangement which has already been widely adopted in this country.

As the name implies, it was first used by the Barrow Corporation, and a number of examples are to be seen in London (*e.g.*, in Prince Regent's Lane, West Ham, and Green Lanes, New Southgate). The double support of the spanning wire, reinforced by the suspension wire, has the effect of preventing any undue vibration from the wind, and yet allows just sufficient "give" to withstand the force of heavy gales. The method

of suspension is also stated to have entirely overcome any effects on the filaments of lamps, due to the vibration of tram poles caused by the passing cars.



The "Barrow" Suspension Device in an Indian City.

Other interesting items in this catalogue are the "Workslite" fittings for use with the half-watt lamps in factories, the "Inverlite" dust-proof fittings for indoor lighting, and the "Orient" lanterns, the finished case of which resembles in shape the domes seen in our illustration.

SHOP LIGHTING DESIGN.

THROUGH the courtesy of the British Thomson-Houston Co. we have been given the opportunity of examining a delightfully got-up portfolio utilised by the engineering staff of the firm in dealing with the planning and specifying of interior lighting, and as an assistance to architects. These data have been prepared by the National X-Ray Reflector Co. of Chicago. One section is devoted to an illustrated booklet on "Planning and Specifying Interior Lighting," in which excellent photographs of a very varied series of lighting installations in schools, hotels, railway stations, &c., is reproduced. Other special installations include offices with "artificial skylight" illumination, and a series of hotels in which indirect lighting on the pedestal system is employed.

What, however, impressed us most was the series of plates in which the position and particulars of the type of unit, the consumption for a given area, the resultant illumination in foot-candles and other data are grouped together, together with a photo of the resultant effect. This series of plates covers the most diverse problems, but the series that interests us most at the present moment is that dealing with shop lighting.

By the courtesy of the British Thomson-Houston Co. we are reproducing on the opposite page a typical chart dealing with this subject. The figures necessary come out rather small, and we have therefore deliberately selected one of the least elaborate of the series. However, it serves to show the ingenious manner in which the design of the lighting system is indicated. We do not recollect having seen a more complete series of engineering data, and the collection illustrates very well modern enterprise in scientific illumination.

OLD MODELS AND NEW METHODS.

THE above is the title of a pleasing little booklet on fixtures by Mr. George Verity. It is attractively printed on rough paper; and the illustrations thereon, by the collotype process, are distinctly unusual in style. The transition from the old to the new, and particularly the adaptation of modern methods to the lighting of interiors in an old and traditional style is pleasantly described and some instances—such as the fittings at the Royal Naval College at Greenwich based on the original designs of Sir Christopher Wren—are quoted.

An interesting section of the book is that dealing with indirect and semi-indirect fittings. Some artistic types are shown, notably those using Wedgwood ware.

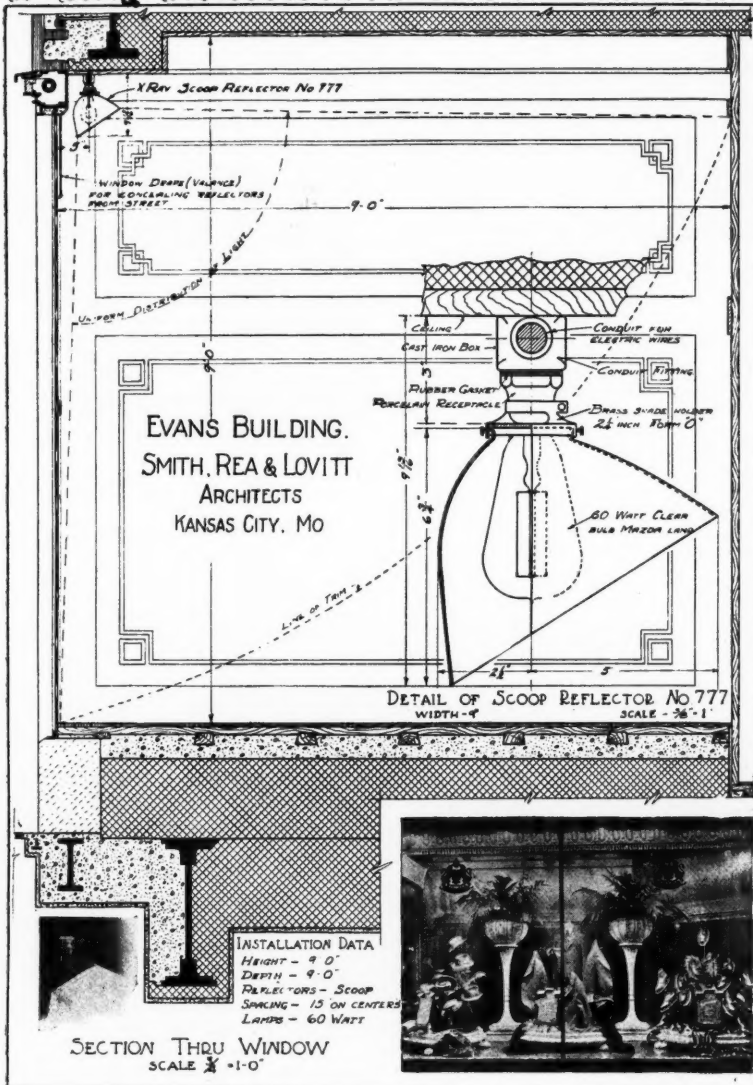
It may be mentioned that since 1819 Verity's have dealt successively with candles, oil, gas and electric lighting, so that they have had ample experience of the bearing of the changes in modern illuminants on fixture design. One of the illustrations shows what is presumably the first electric light fitting in this country—the "electrolier," designed to resemble a basket of flowers and named by analogy with the gasolier, which was exhibited at the Crystal Palace Electrical Exhibition in 1882.



His Own Design

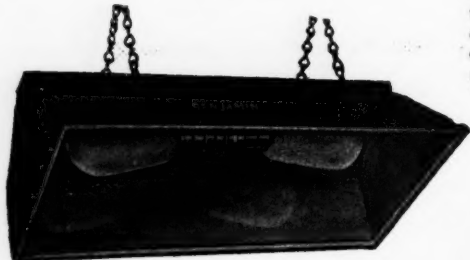
From "Old Models and New Methods."

X-Ray Reflectors For SHOW WINDOWS



A typical chart, containing data on show window lighting, as prepared by the National X-Ray Reflector Co. of Chicago, U.S.A.

BENJAMIN SHOP WINDOW LIGHTING REFLECTORS.



"Extensive" shop window reflector.

In our last number we pointed out that at the present moment scientifically designed shop window reflectors have a special value. Seeing that the use of outside lights is now forbidden, the object of the merchants should be to concentrate their attention in lighting their windows on the stage principle. They should make use of reflectors which not only throw the light on to the goods but *do not allow the rays to escape out through the windows and light up the pavement.*

The new Benjamin reflectors which are illustrated on this page seem to be designed with a view to achieving these results; as the diagrams show, they can be tilted so as to keep the entire flux of light within the window. They are made in two types, "intensive" and "extensive," devoted respectively to shallow and relatively deep windows.

We notice that the Benjamin Electric Ltd. give a useful formula for window lighting as follows:—

$$\text{Number of Watts required} = \frac{\text{Lumens}}{\text{constant}}$$

This constant has the value 5. Thus, of a window 10 ft. long by 6 ft. wide by 6 ft. deep, the total area to be illuminated (floor and back) is $60 + 60 = 120$ square feet in all. If the illumination is 10 ft.-candles 1200 lumens are wanted and the

$$\text{corresponding Wattage is } \frac{1200}{5} = 240.$$

Naturally a general formula of this kind intended to be applied to usual conditions would have to be modified slightly in special cases.

The new Benjamin catalogue from which these data are reproduced is a useful and interesting production. The matter is arranged in a concise way, and

many shapes of reflectors are shown. There are several good photographs of installations taken by artificial light. The remainder of the catalogue is devoted to various Benjamin specialities, such as electric motor-horns, friction drive screw-drivers, tool-sets, &c. We understand also that no less than 67,000 of the new "Ezekleen" metal reflectors (which are



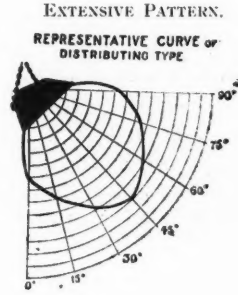
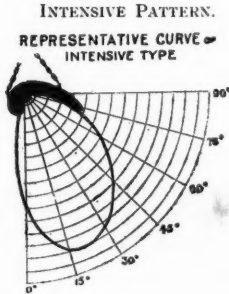
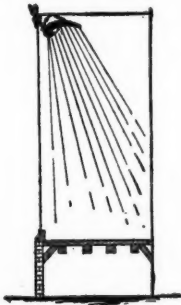
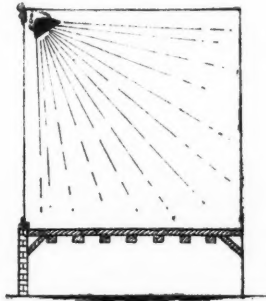
"Intensive" shop window reflector.

intended to replace the shallow opal reflectors previously made abroad in great numbers) have been supplied to the War Office for use in the huts with Kitchener's armies. Finally, there is a short summary of the requirements of industrial lighting. Also of interest are the new half-watt fittings, on which we hope to say something in a subsequent issue.

THE MANUFACTURE OF THORIA AND CERIA IN ENGLAND.

DURING a recent visit to Mr. G. Harrop at the works of the Plaissetty Manufacturing Co., we were informed that a private company, to be known as the "British Thoria Company," was formed early in October last with a view to supplying the chemicals required in the manufacture of incandescent mantles.

We understand that already considerable quantities of thoria, ceria, and alumina are being made, and that early in the new year the process will be in full swing. The establishment of this new chemical business in England should be of great interest to the British incandescent mantle industries.

BENJAMIN "IMPROVED" SHOP WINDOW REFLECTORS.**DISTRIBUTION OF LIGHT.**HIGH AND SHALLOW
WINDOW.HEIGHT AND WIDTH APPROXIMATELY
EQUAL.**TYPICAL SHOP WINDOW INSTALLATIONS CORRESPONDING TO TWO TYPES OF REFLECTORS.****EDISWAN ELECTRICAL PRESENTS.**

THIS is the title of a little Ediswan leaflet describing electrical radiators, kettles, adjustable floor standards, &c.—all British made. Our reference to this inevitably occurs after Christmas is past, but no matter. While the damp weather prevails these Ediswan utilities are likely to continue in request.

We may also mention that the Edison and Swan United Electric Light Co., Ltd., have received a contract for next year's supply of Royal Ediswan lamps to the Cunard Steamship Co.

SOME EXAMPLES OF MODERN INTERIOR SHOP LIGHTING.

THROUGH the courtesy of Messrs. Siemens Bros. Dynamo Works, Ltd., we are giving on these two pages some illustrations of typical modern installations in various stores in and around London.

At the present time, when the lighting of shop windows is being so restricted by the precautions of the authorities, it is absolutely essential for the interior lighting of a store to be thoroughly up-to-date.

The three examples we are giving show several distinct methods. Fig. 1 is a curtain department in a large store at Stratford. The department is lighted by Wotan half-watt lamps in semi-indirect fittings. It is well known that half-watt lamps have proved to be very

suitable for use with the semi-indirect system.

Fig. 2 is a millinery department in a large store at Deptford. In this case we have Albalux ceiling fittings. The illumination on the ceiling is slightly uneven, but the floor illumination is stated to be very uniform and the illustration quite bears this out.

The third illustration again shows a different type of unit, namely Holophane reflector bowls. In all cases the intention has been to screen the light source and distribute the light evenly throughout the store. Without these modern lighting methods the organisation of the modern store could not run smoothly. Good lighting is essential to good service.



FIG. 3.—A department at Whiteley's Stores lighted by Wotan lamps in Holophane Reflector Bowls.

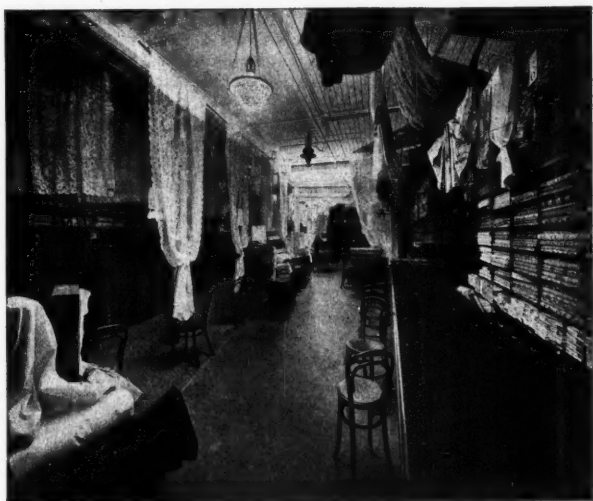


FIG. 1.—A large store in Stratford lighted by Wotan half-watt lamps in opal semi-indirect fittings.

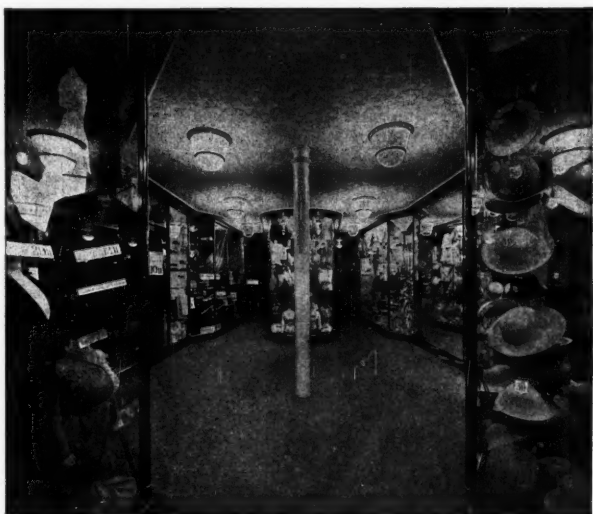


FIG. 2.—A large store at Deptford lighted by standard Wotan lamps in Albalux ceiling fittings.

HOLOPHANE GLASSWARE FOR OUTSIDE LIGHTING.

A NEW catalogue just issued by **Holophane Ltd.** describes some entirely new fittings for use with Half-Watt lamps, and designed for street and outside shop lighting. We illustrate some of these types. Fig. 1 shows in section the construction of the glassware which is based on an entirely new principle, prismatic glassware: namely, constructing the globe of two prismatic

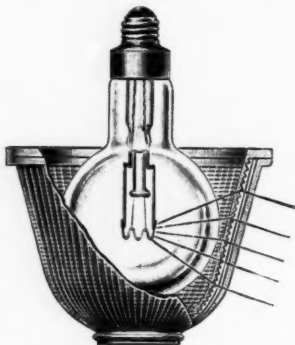


FIG. 1.—Cross section of Holophane Refractor Globe, showing course of rays through the prisms.

elements mounted one inside the other so as to have the desired distributing effect on the light, and yet to present a smooth surface on both sides. By reason of this smoothness the unit is easy to clean and does not accumulate dust. It can hardly be doubted that the mechanical difficulties in producing a unit of this kind are considerable, and to overcome them is a very creditable piece of work.

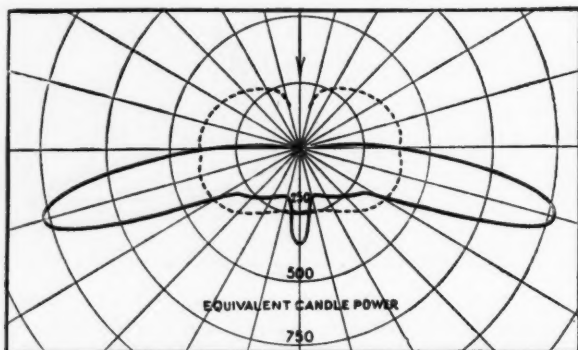
The advantages of the unit are stated to be as follows:—

1. The maximum light is sent out at an angle 15° below the horizontal.
2. The intrinsic brilliancy of the filament is reduced whilst the absorption is practically negligible.
3. The lamp is weather-protected.
4. The enclosing glass unit allows for ventilation, and not a collector of dirt.
5. The cost of maintenance of the enclosing glass unit is small.
6. The light is distributed evenly over a wide area, as shown by the characteristic polar curve.



FIG. 2.—Typical Fitting.

For street lighting such a unit should be very useful. It achieves the result of securing the desired distribution of light, so as to illuminate the pavement evenly by altering the direction of the rays and without absorbing a considerable proportion of the light. At the same time the diffusion of the light helps to remove glare.



Distribution of Light from above unit.
Lamp alone (shown dotted). Lamp with "Refractor Lantern" (shown full).

THE "ZENDA" HIGH PRESSURE PETROLEUM LAMP.

Of late years the use of high pressure oil lamps with incandescent mantles has considerably extended the applications of this illuminant. We had recently an opportunity of inspecting the "Zenda" lamp which is a Swedish invention adapted to the use of Russian paraffin oil, such as can readily be obtained at all local stores. The standard size of lamp yields 800-1000 candle-power according to type, and it is said that the cost of oil consumption does not amount to more than three-eighths of a penny per hour.

There are two essential parts, the lamp itself and the container for the oil, which are connected by thin copper piping of any desired length.

The container is separated into two compartments: the lower and smaller part where the air is compressed and stored, and the upper part that which holds the oil. The container is charged with two gallons of oil and the pressure is raised by means of a small hand pump to six atmospheres, as shown on a dial. While the lamp is in use, however, the pressure used in the container is maintained constant at two and a half atmospheres by means of a reducing valve. Like other lamps of this kind the Zenda lamp is started by means of a little methylated spirit. When the cock is turned on the oil flows into the vapourising chamber in the lamp, issuing from the same through a small hole in the nipple in the form of hot vapour and mixing freely with the air before entering into the burner. An interesting point to be noticed is that after the lamp has been extinguished the unused oil returns to the container and is used again when the lamp is next lighted. Another point is the special needle for cleaning the nozzle—a process which can be executed without disarranging the lamp.

There is no need for repumping until all the oil in the container has been exhausted, notwithstanding the fact of the lamp being turned out and relighted several times.

It is stated that the lamp can be used equally well for indoor or outdoor lighting, and can be either suspended or mounted on posts or brackets. With the advantages named above it should be of interest to many engineers concerned with illumination.

ACETYLENE AND THE WAR.

THE proceedings of the British Acetylene and Welding Association for December, 1914, contain an interesting article describing the use of acetylene in connection with the war. Hitherto these proceedings have appeared in the form of a special inset in the *Acetylene and Welding Journal*. This issue marks a new departure, namely, the publication of the proceedings of the Association as a separate journal.

It is pointed out that the demand for acetylene apparatus has been very great and manufacturers are working at high pressure. "One wonders," the writer remarks, "what Napoleon would say if he could return to-day to his old battlefields in France and Belgium." One thing that would certainly strike him would be the great part played by light in the military proceedings of to-day. "At Malmaison there is exhibited a portable travelling desk which Napoleon always carried with him in the field. As a part of this desk's equipment the visitor is shown a small reflector candlestick in which there remains the unused part of a tallow candle just as it was left by Napoleon. It was this dim light which illuminated the despatches which won some of his most brilliant victories."

At the present moment acetylene is being widely used for lighting the tents, field hospitals, &c., and in the form of portable searchlights. In the Navy auto-acetylene welding is invaluable for repair purposes, and in the kitchen motor vans, acetylene cooking ranges are frequently used, the gas being supplied from a compact portable generator fixed to the footboard of the van.

OSRAM HALF-WATT LAMPS.

IT is now just about a year since the Osram Half-Watt Lamp was introduced to the British people, so there has been time to examine their practical qualities. Our attention has been drawn to an installation of fourteen 110-volt 500-watt lamps in a large paper mill. It is stated that the average life of these lamps was as high as 1,505 hours and that the candle-power has not diminished appreciably since they were installed.

We understand that Half-Watt lamps are now being made in considerable quantities at the Osram Lamp Works, and a leaflet has recently been issued giving particulars and prices.

ELECTRIC LIGHT FIXTURES.

G.E.C. 1915 CATALOGUE (F SECTION).

THE 14th edition of the above catalogue, recently issued by the General Electric Co., Ltd., is divided into seven sections dealing respectively with pendants, brackets, ceiling fixtures, electroliers, standards, bronzes, and crystal fixtures. Over 100 pages have been added; certain special lines, accessories, glassware, signs, &c., are now issued in a separate catalogue.

The pendant section now includes a special series of direct and semi-indirect fittings ("Dalite" system) some excellent examples of which are illustrated in the view of a showroom at the Company's Head Office.

Crystal fixtures and bronzes are, we think, specially well illustrated, and we notice also several pages given up to the Vase standards. China models of this type of fitting have been quite popular, and the styles executed in real Copeland Ware should be much appreciated.

We are glad to see that the Company, in referring to the various glasses (Superlux, Equiluxo, Holophane, &c.) emphasise the importance of securing maximum efficiency and artistic effect: "in other words, the best light and the most of it."

SHELL-PROOF EDISWAN LAMPS.

THE following is an interesting letter received from a soldier at the front, which illustrates the ability to resist vibration of the Ediswan lamps:—

December 5th, 1914.

Messrs. The Ediswan Electric Light Co.,
London.

DEAR SIRS,

While passing through the town of—which has recently been heavily shelled by the German artillery, we entered a house that had suffered severely. Amongst other things I noticed was one of your lamps still hanging from the ceiling and perfectly intact in every way, and this although almost every other thing in the house had been smashed or ruined in some way.

I write this thinking it may be of interest to your good selves, and remain,

Yours faithfully,

P.S.—Owing to censoring, it is impossible to write you the town in question.

ELECTRICAL FIXTURES.**A Recent Publication by Messrs. Falk, Stadelmann & Co.**

MESSRS. FALK, STADELMANN & Co. have just issued an abridged addition of the general list of fixtures. Specimens of characteristic types of fixtures—brackets, lanterns, electroliers, &c.—are shown, and bowl fittings of Holophane, Onyx, and other semi-indirect types are included.

During a recent visit to the showrooms of the Company we had an opportunity of seeing many of the types shown in the catalogue. Readers will recall that these showrooms in Farringdon Road are unique for the fact that fittings for gas, oil, and electricity are all on view, and the area occupied is very large. We were impressed particularly by the series of handsome fittings for oil lamps in which this firm does a very large trade. The arrangement of these large showrooms is excellent in several respects, notably in the subdivision of various styles into separate rooms. There is also an ingenious optical effect by means of which the showrooms appear to open out on to a garden at the back. The lighting of the artificial scenery has quite a life-like effect.

Perhaps the most impressive room is that given up to semi-indirect lighting. Here a series of delightful Onyx, Alabaster, and other decorative bowls are on view, some of them of remarkable size. We should think that some of these handsome fittings would be particularly interesting to architects and might be used to advantage in some public buildings where the existing lighting is capable of improvement.

AN OSRAM NOVELTY.

AN ingenious little advertising device is the "Surprise Envelope" now being circularised by the **General Electric Co., Ltd.** The envelope is in a sense a Jack-in-the-Box, out of which there leaps, on opening, a soldierly figure created by John Hassel. His helmet is an Osram lamp, his epaulette a tumbler switch, and he is wearing the Order of the Magnet. His extended left hand points to the words:—

"Now, Sir! Are you using Osrams? I flatter myself that they can do more work on less current than any other light troops in the world!"

A leaflet in the envelope gives prices of Osram lamps and bears a reproduction of the Osram Lamp Works where 1,500 British workpeople are constantly employed.

INDEX, January, 1915.

	PAGE
Correspondence—	
Lighting Conditions in Paris in War Time	Prof. A. BLONDEL 27
Shop Lighting in War Time	F. W. WILLCOX 28
Dyers' Hall, Lighting of the	10
Editorial	L. GASTER .. 1
Illuminating Engineering, Summary of Progress during Past Year	5
Illuminating Engineering Society—	
(FOUNDED IN LONDON 1909).	
Account of Meeting on December 1st, 1914	11
New Members	12
Illuminating Engineering in War Time	L. Gaster 13
Discussion—[F. W. Goodenough—J. W. T. Welsh—F. Bailey—W. J. Liberty— T. E. Ritchie—A. Cunningham—F. W. Willcox—J. Macintyre—C. Bussell— F. C. Tilley]	20
Rating of Lamps in Lumens	12
School Lighting, U.S.A. Committee on	39
Topical and Industrial Section—	
Modern Lighting Fittings in the East	29
Shop Lighting Design—Old Models and New Methods	30
Benjamin Improved Shop Lighting Reflectors	32
Manufacture of Thoria and Ceria in England	32
Modern Show-Window Lighting	34
A Holophane Unit for Outside Lighting.. .. .	36
The Zenda High Pressure Petroleum Lamp	37
Electrical Fixtures—An Osram Novelty—New G.E.C. Fixture Catalogue	38
War Time, Lighting in	28

A COMMITTEE ON SCHOOL LIGHTING.

A COMMITTEE on School Lighting has recently been organised in the Illuminating Engineering Society under the chairmanship of M. Luckiesh, Nela Park, Cleveland, Ohio. The object of this Committee is briefly as follows:

To prepare a lecture dealing with the conservation of eyesight of school children to be presented before school authorities. This lecture will include the fundamental principles underlying good and bad natural and artificial lighting, the use of window shades, the colour of walls and ceiling, glare from blackboards, glazed paper and other polished surfaces, and general information on how to use the eyes.

To report on lighting conditions in schools.

To prepare plans and specifications of model class rooms.

To introduce brief courses in lighting

as a part of the home-making and practical physics courses.

To construct a miniature model class room for exhibition purposes.

To prepare a code for school lighting suitable for legislature purposes.

To give general publicity to the importance of good lighting in conserving vision.

The importance of the work of this Committee to the human race is evident when it is considered that there are 18,000,000 pairs of eyes in our public schools daily subjected to the strain of study and the performance of other work equally trying on the eyes.

REVIEW OF THE TECHNICAL PRESS.

(Owing to the pressure of other matter we are holding over the Review of the Technical Press until next issue.—ED.)

Preliminary Announcement.**THE LUMINA BUREAU.**

AN ADVISORY BUREAU ON ALL MATTERS CONNECTED WITH ILLUMINATION.

The **LUMINA** Bureau has been formed to give advice on all matters connected with illumination. It is independent of all trade connections, and is therefore in a position to give unbiased information and to deal impartially with all illuminants.

Each inquiry will be referred to an Expert on the subject.

Among other matters the Bureau is prepared to undertake :—

- (1) The Planning of Lighting Installations for Factories, Offices, Shops, Streets, &c.
- (2) Reporting on the Merits of Schemes of Illumination submitted.
- (3) Advice on the Merits of Patents on Lamps and Lighting Appliances.
- (4) Advice on Ancient Light Cases.
- (5) Arbitration of Disputes on Lighting Installations, &c.
- (6) The Preparation of suitable Literature on all matters of illumination.
- (7) Expert Photography of Installation by Day and Artificial Light.

INQUIRIES TO BE ADDRESSED TO :—

THE **LUMINA** BUREAU, 32, Victoria Street, LONDON, S.W.

Tel. : VICTORIA 5215.

Natural Photographs by Artificial Light.**SEEING IS BELIEVING—SEE THINGS TRUE!**

A Collection of Photographs, taken entirely by Artificial Light, is incomparably the best method of demonstrating your system of lighting to a customer.

Such Photographs are better than any verbal description, and show at a glance what the appearance of an installation will be. The impression of *The Eye* is more vivid and lasting than that of *The Ear*. *A charming picture forms one of the best possible advertisements.*

We are prepared to photograph lighting installations of all kinds, simply by the artificial light existing in the room and without flashlight or other extraneous aid. Owing to the wide experience at our disposal we can bring out the chief features and enable all the merits and charms of an installation to be properly seen.

Many of our photographs have appeared in *The Illuminating Engineer*. They show both the actual conditions of illumination and the lighting units employed, and will be appreciated by any firm interested in illuminating engineering and lighting appliances.

APPLY FOR PARTICULARS TO :—

The **LUMINA** Bureau Photographic Dept., 32, Victoria Street, London, S.W.

Tel. : VICTORIA 5215.

